SPECIFICATION FOR

CANADAIR MODEL CL-41-1 TRAINER AIRPLANE

REPORT NO R.D.-41-100 7 SEPT. 1956

C-L

CANADAIR LIMITED

COPY NO. 55

CONFIDENTIAL

SPECIFICATION FOR

CANADAIR MODEL CL-41-1 TRAINER AIRPLANE

REPORT NO R.D.-41-100 7 SEPT. 1956

CONFIDENTIAL

F.5904 REV.4/55

SUBJECT-

TABLE OF CONTENTS

CONFIDENTIAL

Paragraph No.	Title	Page No.
1.	Scope and Classification	1
2.	Applicable Specifications and Publications	1
3	Requirements	1
3.1.	Characteristics	1
3.1.1.	Three View Drawing and Inboard Profile	1
3.1.2.	Performance	1
3.1.3.	Weights	17
3.1.4.	Centre of Gravity Locations	21
3.1.5.	Areas	22
3.1.6.	Dimensions and General Data	22
3.1.7.	Control Surface and Corresponding Control Movements	24
3.2.	General	25
3.2.1.	General Interior Arrangement	25
3.2.2.	Materials and Standard Parts	25
3.2.3.	Workmanship	25
3.2.4.	Production Maintenance and Repair	25
3.2.5.	Interchangeability and Replaceability	25
3.2.6.	Finish	26
3.2.7,	Identification Markings and Color Scheme	26
3.2.8.	Extreme Temperature Operation	26
3.2.9.	Climatic Conditions	26
3.2.10.	Lubrication	26

SUBJECT-

TABLE OF CONTENTS
(Cont'd)

CONFIDENTIAL

Paragraph No.	Title	Page No.
3.2.11.	Equipment Installation	26
3.2.12.	Crew	27
3.3.	Aerodynamics	27
3.3.1.	General	27
3.3.2.	Stability and Control	28
3.4.	Structural Design Criteria	28
3.4.1.	Limit Flight Load Factors	28
3.4.2.	Limit Ground Load Factors	29
3.4.3.	Limit Dive Speed	29
3.4.4.	Ditching Criteria	29
3.5.	Wing Group	30
3.5.1.	Description and Components	30
3.5.2.	Construction	30
3.5.3.	Ailerons	31
3.5.4.	Lift and Drag Increasing Devices	31
3.6.	Tail Group	31
3.6.1.	Description and Components	31
3.6.2.	Stabilizer	32
3.6.3.	Elevators	32
3.6.4.	Fin	32
3.6.5.	Rudder	32

F.5904 REV.4/55

SUBJECT-

TABLE OF CONTENTS (Cont'd)

CONFIDENTIAL

Paragraph No.	Title	Page No
3.7.	Body Group	32
3.7.1.	Fuselage	32
3.8.	Alighting Gear (Wheel Type)	34
3.8.1.	General Description	34
3.8.2.	Main Landing Gear	35
3.8.3.	Auxiliary Landing Gear (Nose)	36
3.9.	Alighting Gear (Water Type)	37
3.10.	Surface Control System	37
3.10.1.	Primary Flight Control Systems	37
3.10.2.	Secondary Flight Control System	38
3.11.	Engine Section or Nacelle Group	39
3.11.1.	Description and Components	39
3.11.2.	Engine Mounts	39
3.11.3.	Tail Pipe	39
3.11.4.	Firewalls	40
3.12.	Propulsion	40
3.12.1.	General Description and Components	40
3.12.2.	Main Propulsion Unit	40
3.12.3.	Auxiliary Propulsion Units	40
3.12.4.	Engine Driven Accessories	40
3.12.5.	Air Induction System	41
3.12.6.	Exhaust System	41
3.12.7.	Cooling System	41
3.12.8.	Lubrication System	41

SUBJECT-

TABLE OF CONTENTS (Cont'd)

CONFIDENTIAL

Paragraph No.	Title	Page No
3.12.9.	Fuel System	42
3.12.10.	Water Injection System	43
3.12.11.	Propulsion System Control	43
3.12.12.	Starting System	43
3.12.13.	Propeller	43
3.12.14.	Rocket Propulsion System	43
3.13.	Auxiliary Power Plant	44
3.14.	Instruments and Navigational System	44
3.14.1.	Instruments	44
3.14.2.	Navigational Instruments	45
3.14.3.	Installation	45
3.15.	Hydraulic and Pneumatic Systems	45
3.15.1.	Hydraulic System	45
3.16.	Electrical System	46
3.16.1.	Description	46
3.16.2.	Electrical Power Supply	46
3.16.3.	Electrical Power Conversion	47
3.16.4.	Equipment Installation	47
3.16.5.	Wiring	47
3.16.6.	Bonding and Shielding	47
3.16.7.	Controls	47
3.16.8.	Lighting	47
3.16.9.	Ignition and Starting Control System	48

F. 5904 REV. 4/55

SUBJECT-

TABLE OF CONTENTS
(Cont'd)

CONFIDENTIAL

Paragraph No.	Title	Page No.
3.16.10	Receptacles	48
3.16.11.	Indicators	48
3.16.12.	Electrical Drives	49
3.16.13.	Filters	49
3.17.	Electronics	49
3.17.1.	Communication Equipment	50
3.17.2.	Navigation Equipment	50
3.17.3.	Radar	51
3.17.4.	Electronic Countermeasures	51
3.17.5.	Electronic Guidance System	51
3.17.6.	Static Dischargers	51
3.17.7.	Emergency Rescue Transmitter	51
3.17.8.	Installation of Electronic Equipment	51
3.17.0.	Inspection and Maintenance	51
3.18.	Armament	51
3.19.	Furnishings and Equipment	51
3.19.1.	Accommodations for Personnel	51
3.19.2.	Miscellaneous Equipment	52
3.19.3.	Furnishings	52
3.19.4.	Emergency Equipment	52
3.19.5.	Oxygen Equipment	52
3.19.6.	Emergency Rescue Equipment	53

SUBJECT- TABLE OF CONTENTS (Cont'd)

CONFIDENTIAL

Paragraph No	Title	Page No.
3.20	Air Conditioning and Anti-Icing Equipment	53
3.20.1.	Air Conditioning	53
3.20.2.	Anti-Icing	54
3.21.	Photographic	54
3.22.	Auxiliary Gear	54
3.22.1.	Towing Gear	54
3.22.2.	Jacking Provisions	54
3.22.3.	Mooring Provisions	55
3.22.4.	Hoisting Provisions	55
3.22.5.	Levelling	55
3.22.6.	Covers and Shields	55
4.	Sampling, Inspection and Test Procedures	55
5.	Preparation for Delivery	55
6.	Notes	55
6.1.	Definitions	55
Appendices		57
	Appendix I	57
	Equipment Breakdown	57

MODEL SPECIFICATION

FOR

JET TRAINER

1. SCOPE AND CLASSIFICATION

1.1 This specification covers the following Trainer Airplane:-

Royal Canadian Air Force designation	
Canadair Limited	Model CL-41
Number of places	Two - side by side
Number of engines	One
Type of engine	Turbojet

1.1.1 The mission of this airplane is the instruction of student pilots in all flight and ground manoeuvers and techniques which are required of the military pilot.

2. APPLICABLE SPECIFICATIONS AND PUBLICATIONS

2.1 Manual of Aircraft Design Requirements for the Royal Canadian Air Force, CAP 479 First Edition.

2.2 Handbook of Instructions for Aircraft Designers. HIAD tenth Edition. ARDCM80-1
Volume 1 Piloted Aircraft
Volume III Aircraft Design Control Drawings

3. REQUIREMENTS

3.1 Characteristics

3.1.1 Three View and Inboard Drawings - - See Figure 1 and 2, page 5 and 6.

3.1.2 Performance - - The estimated performance of the airplane described in this specification is given in paragraph 3.1.2.1 A basic objective has been to develop an airplane having the widest range of performance consistent with the effective inclusion of the requirements for the pilot training role. Careful selection of airfoils and geometry has resulted in a conventional configuration which will not require new techniques to achieve the desired performance.

3.1.2.1 Performance Summary

(Based on design gross weight = 6250 lb.)

TAKE-OFF GROSS WEIGHT	lb.	6250
Fuel weight (J.P. -4)	lb.	1965
Weight at half fuel	lb.	5273
Take-off distance to 50 ft. at sea level (1)	ft.	1860
Rate of climb at intermediate power (1)	f.p.m.	
sea level		2640
30,000 ft.		750
Time to 30,000 ft. at intermediate power (2)	min.	18.1
Service ceiling at intermediate power (2)	ft.	41,800
Maximum level speed at maximum power (3)	knots T.A.S.	
sea level		348
30,000 ft.		369
Maximum cruise speed at maximum continuous power (3)	knots T.A.S.	
sea level		302
30,000 ft.		330
Stalling speed in landing configuration (3)	knots E.A.S.	61
Landing distance from 50 ft. at sea level (3)	ft.	1720

MAXIMUM RANGE MISSION

Range	N.Mi.	833
Average cruise height	ft.	39,500
Average cruise speed	knots	300
Total time	hrs.	2.91
Landing reserve (10% initial fuel)	lb.	197

SUBJECT-

CONFIDENTIAL

3.1.2.1 Performance Summary (Cont'd)

TRAINING CIRCUITS MISSION

Number of circuits		14
Duration of circuits	hrs.	2.1
Stand-off time at 5000 ft.	hrs.	0.5

Notes:

(1) At take-off gross weight

(2) Based on initial climb weight (take-off gross weight less warm-up and take-off fuel allowance); weight reduced during climb.

(3) At half-fuel weight.

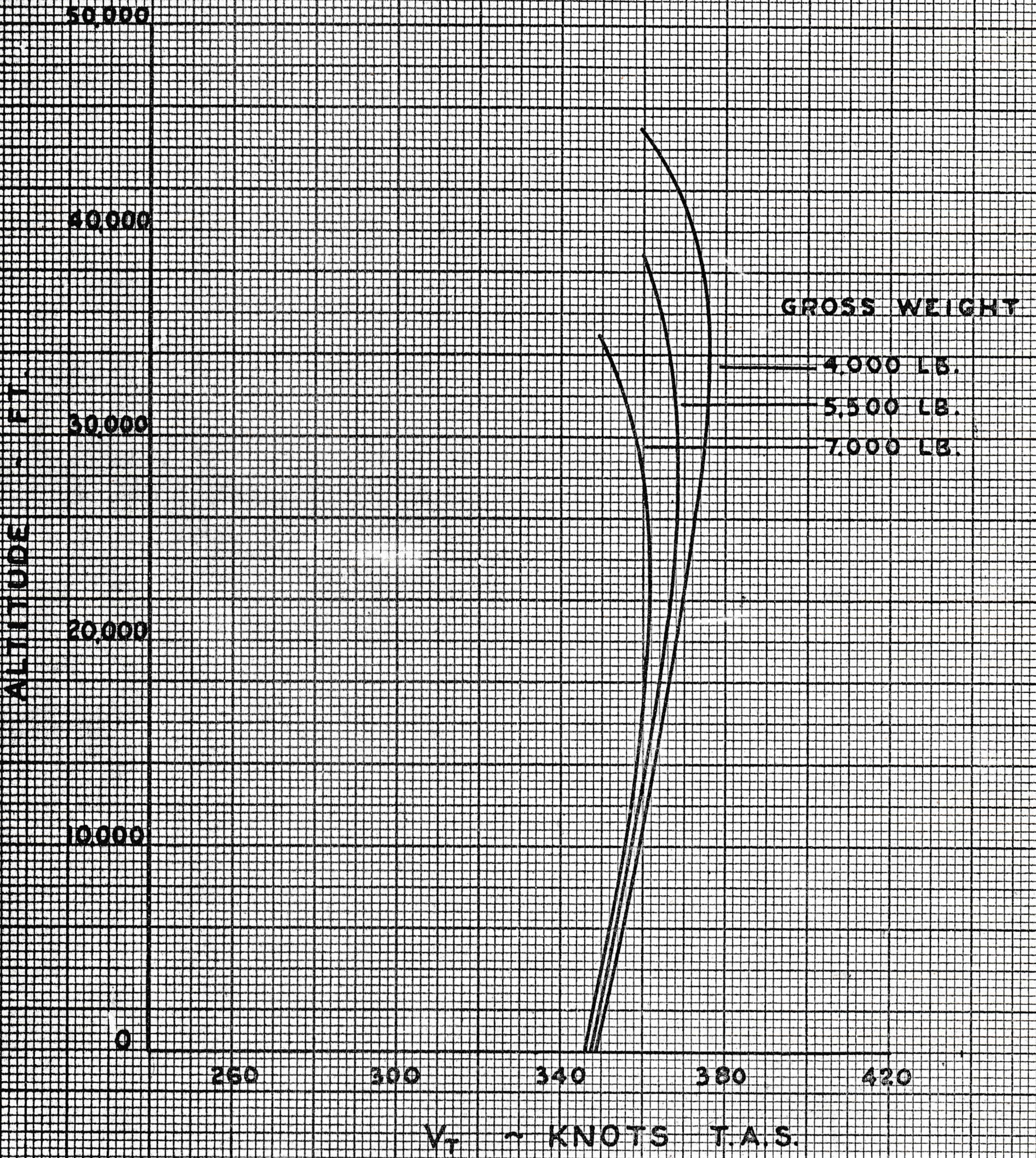
3.1.2.2 The performance specified herein is based on the engine performance supplied by Rolls-Royce Limited as follows:-

a) Brochure No. PP-20 entitled - RB-108 Propulsion Engine - Preliminary Performance Data and Installation Notes. Dated May 1955.

b) Letter from Rolls-Royce of Canada to Canadair Reference AM.S/E-11/GT - Additional information to Rolls-Royce Brochure No. PP-20. Letter dated 14th September 1955.

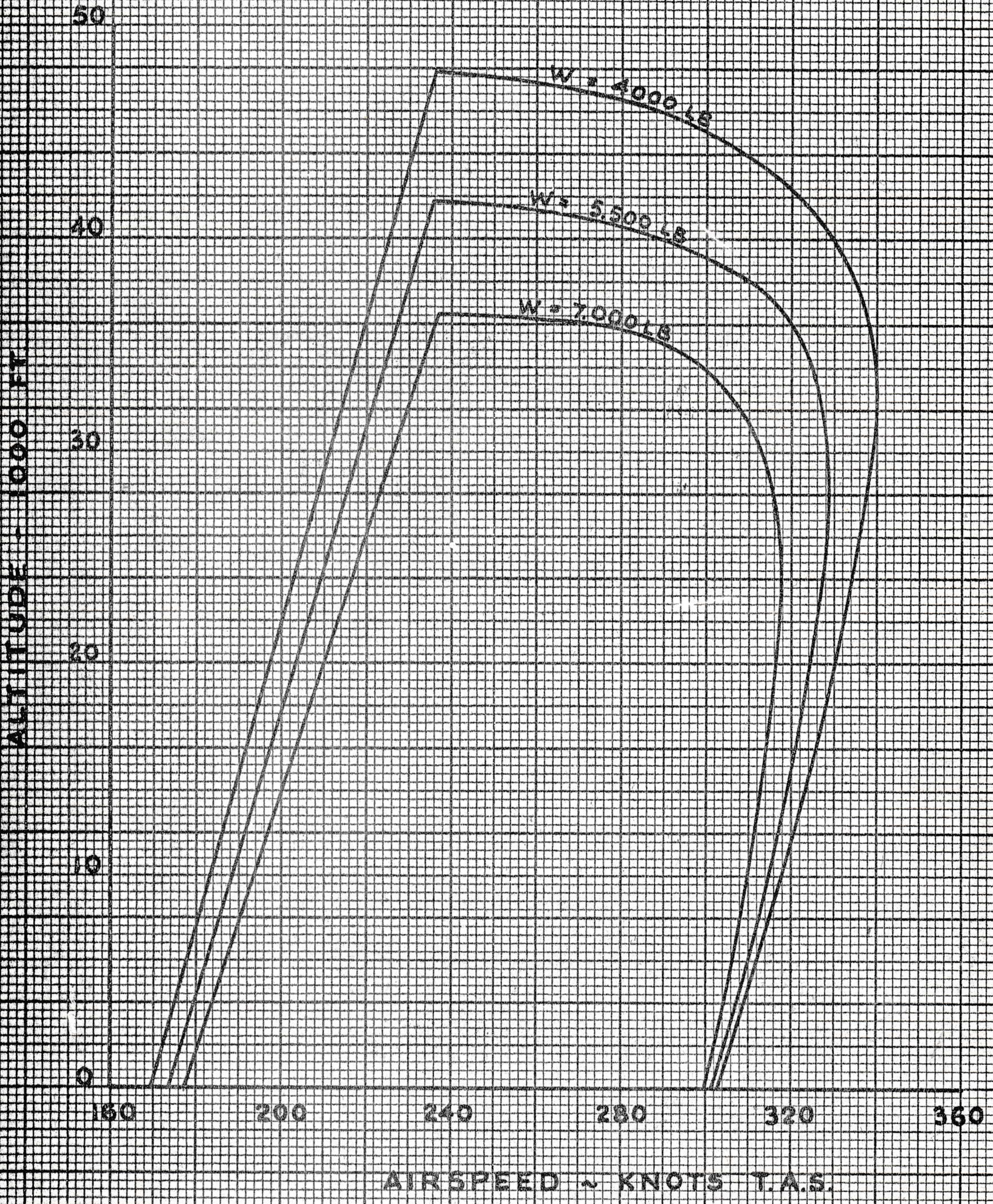
SPEEDS FOR LEVEL FLIGHT

MAXIMUM RATING
17,500 R.P.M.



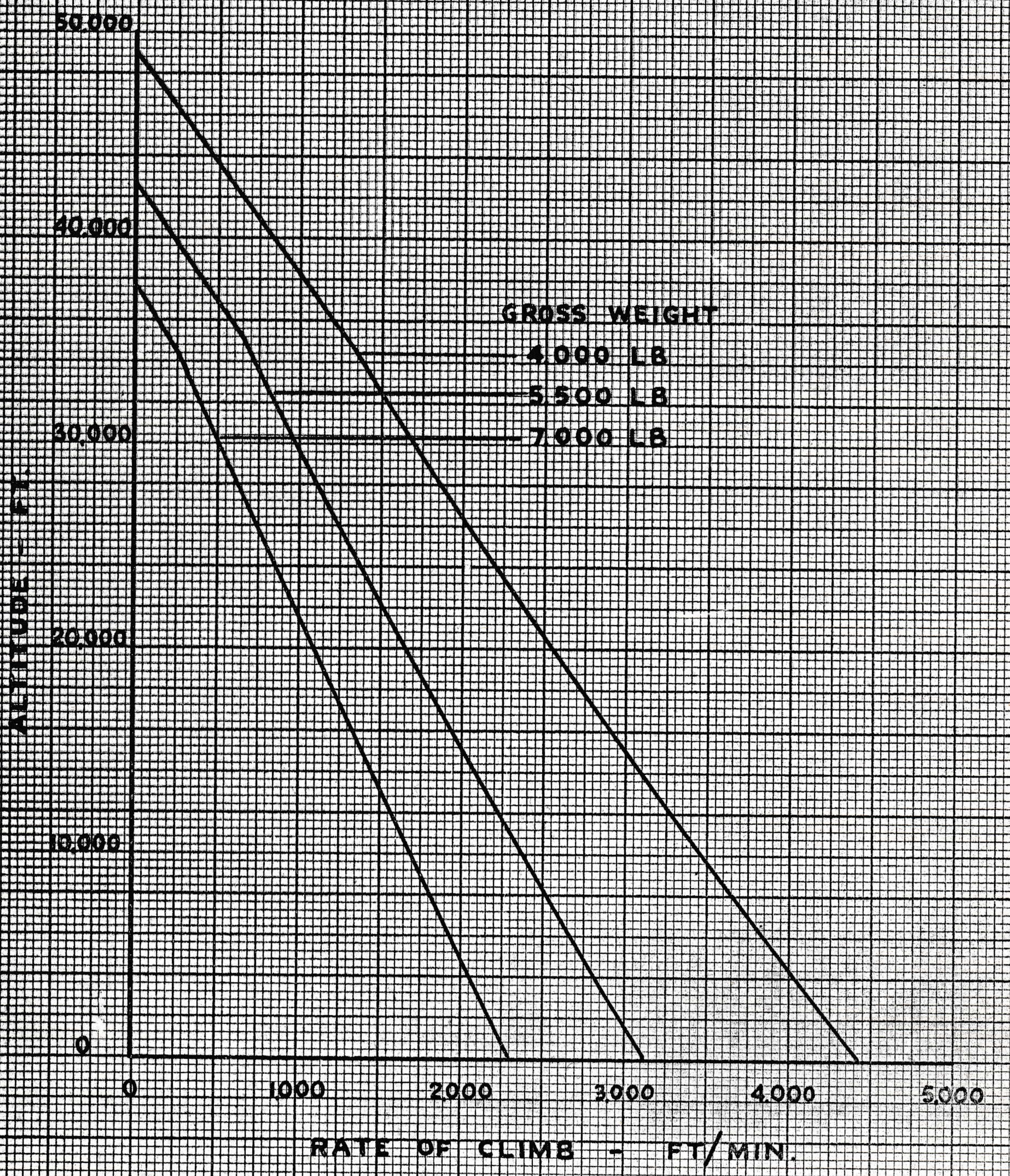
SPEEDS FOR LEVEL FLIGHT AND MAX. RATE OF CLIMB

MAX CONTINUOUS RATING ~ 16,500 R.P.M.



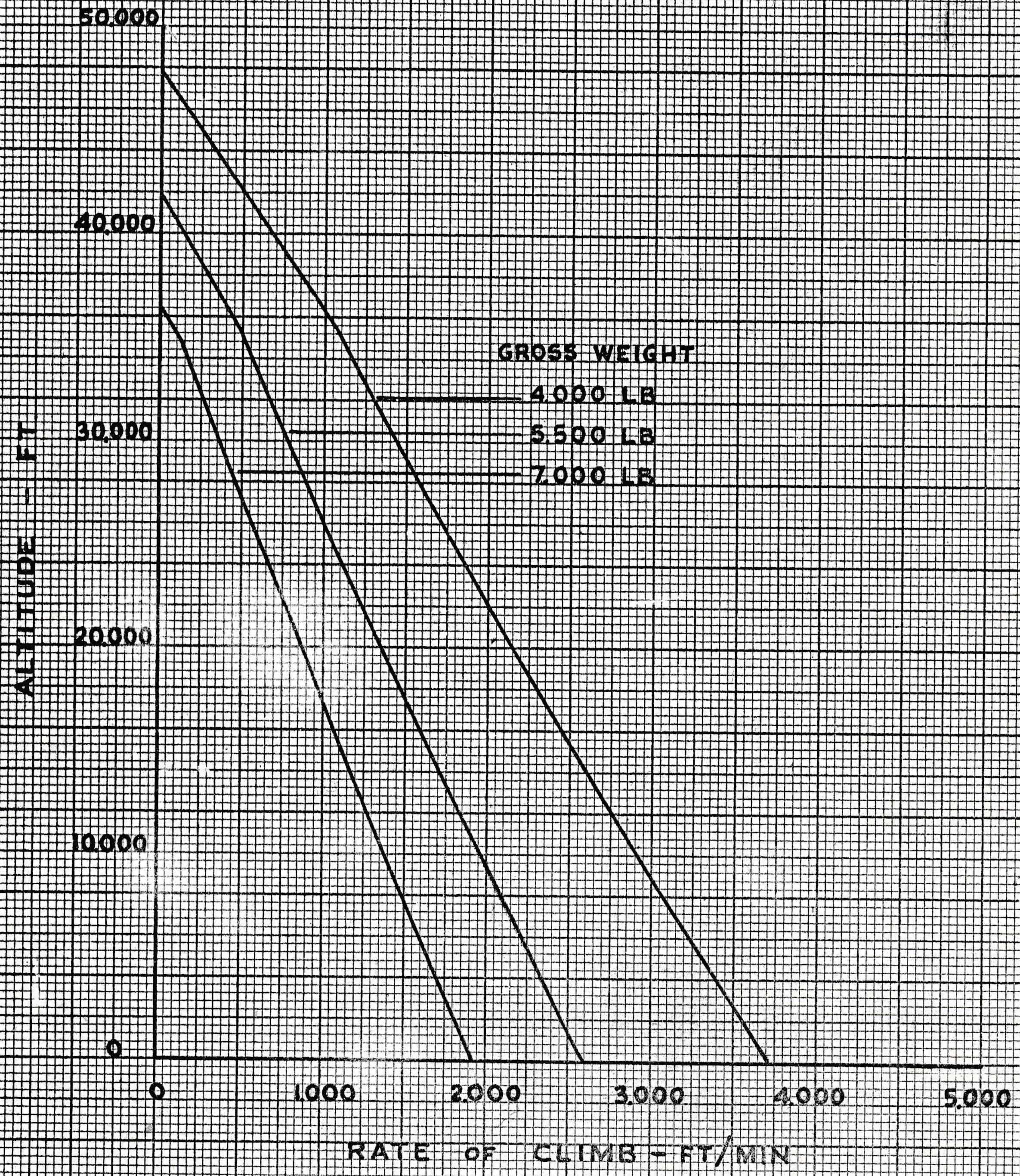
RATE OF CLIMB AT CONSTANT WEIGHT

INTERMEDIATE RATING - 17,000 R.P.M.



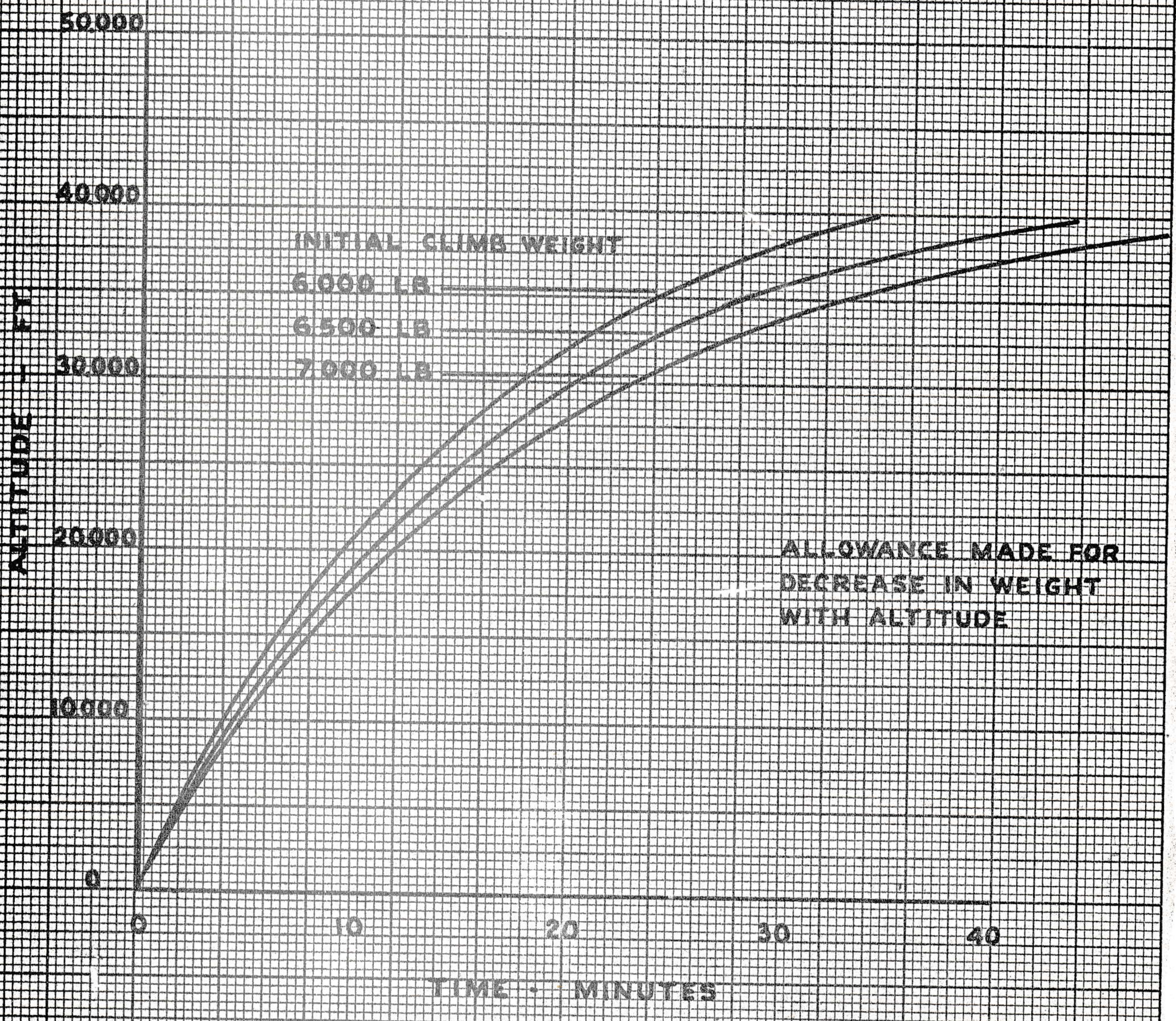
RATE OF CLIMB AT CONSTANT WEIGHT

MAXIMUM CONTINUOUS RATING - 16,500 R.P.M.



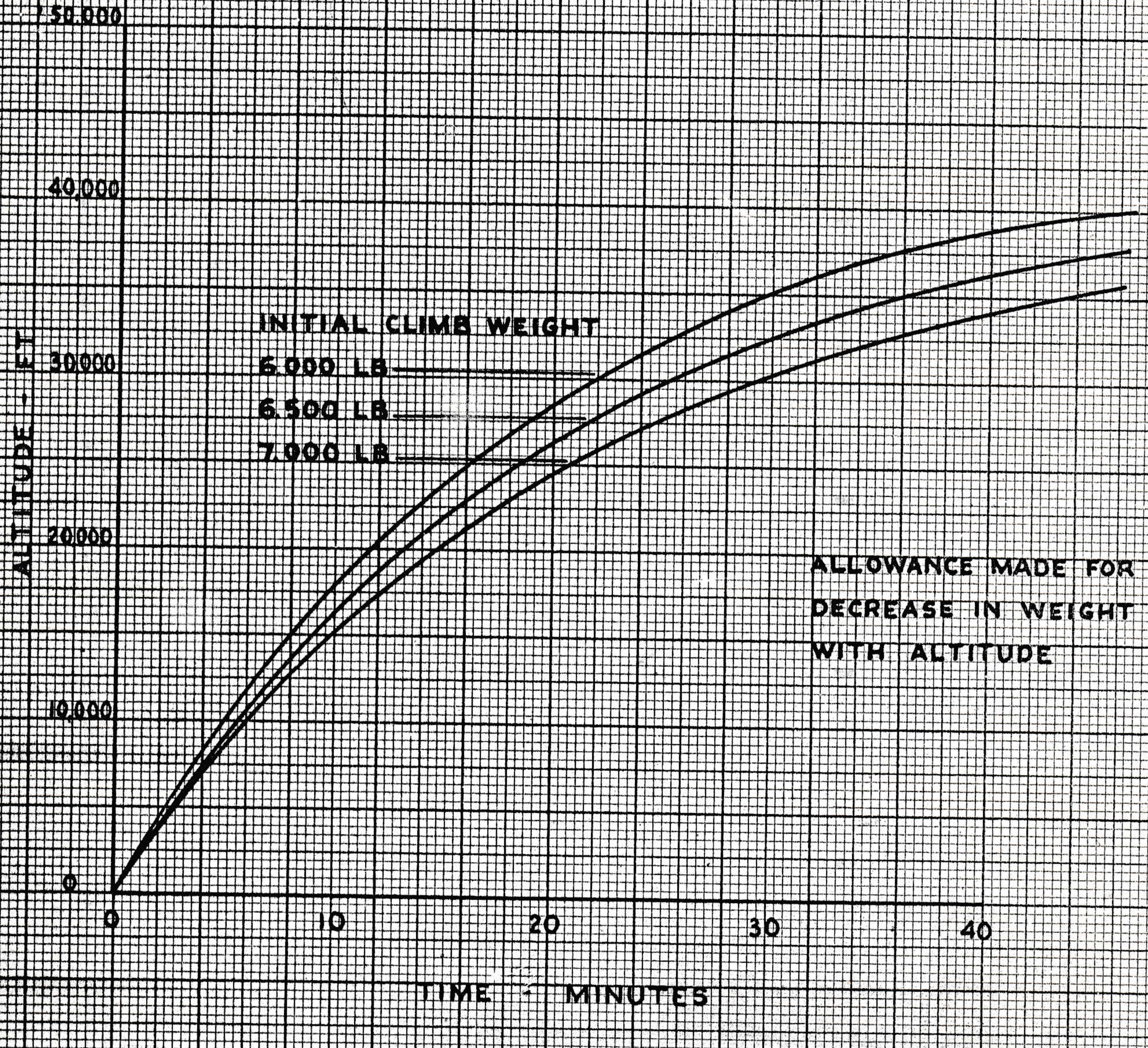
TIME TO CLIMB

INTERMEDIATE RATING - 17,000 RPM



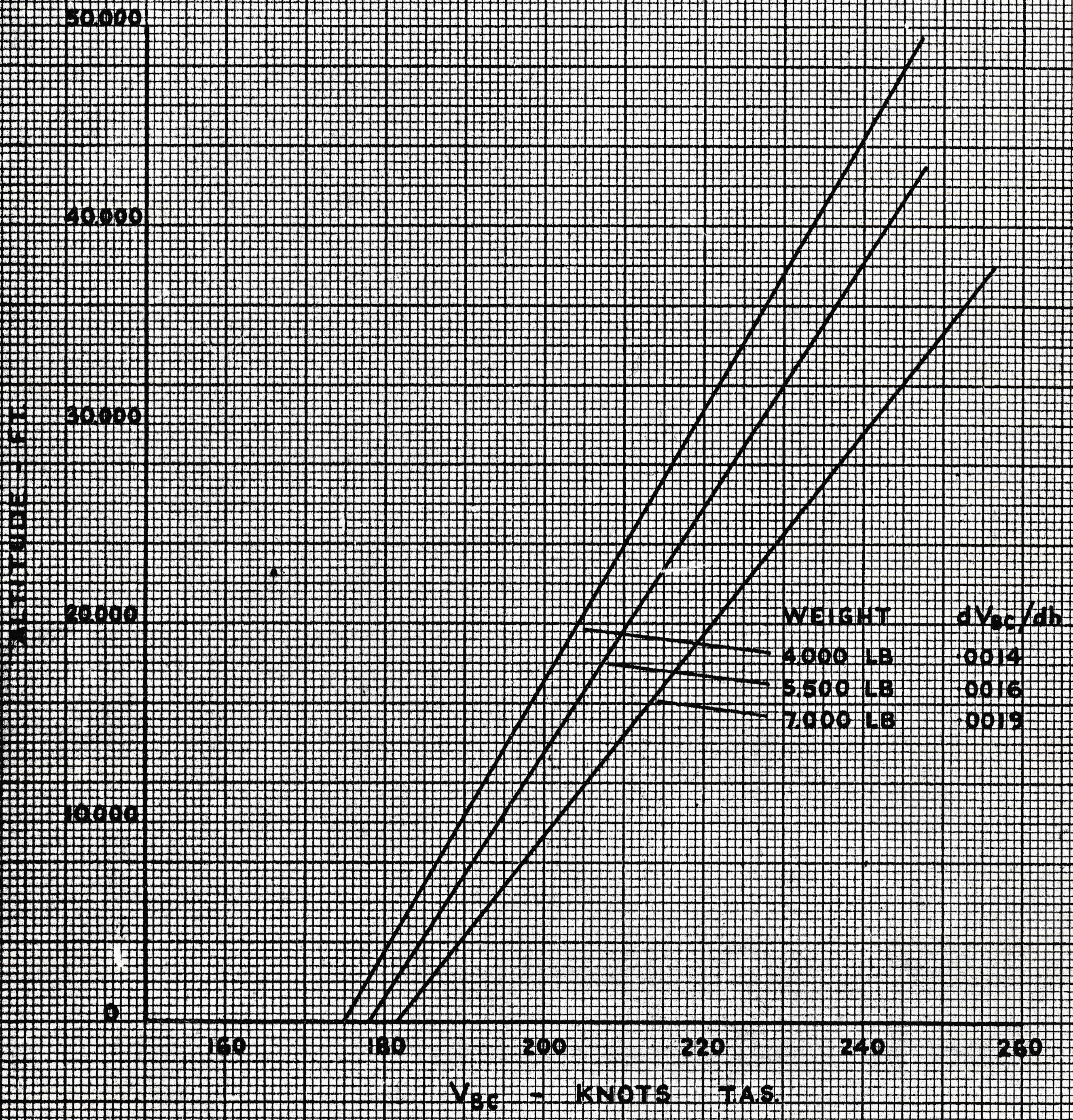
TIME TO CLIMB

MAXIMUM CONTINUOUS RATING - 16,500 R.P.M.

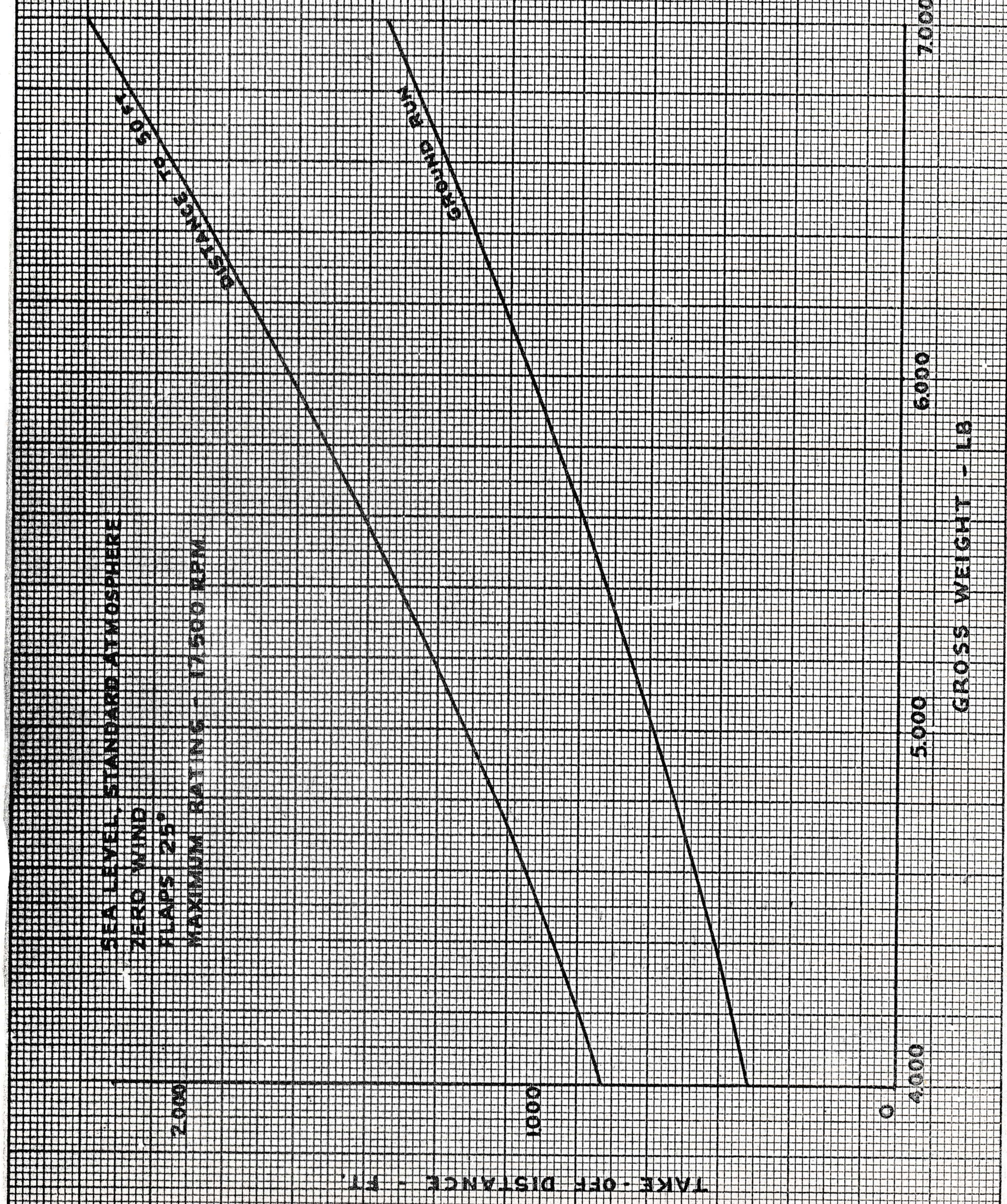


BEST CLIMB SPEED V_{BC}

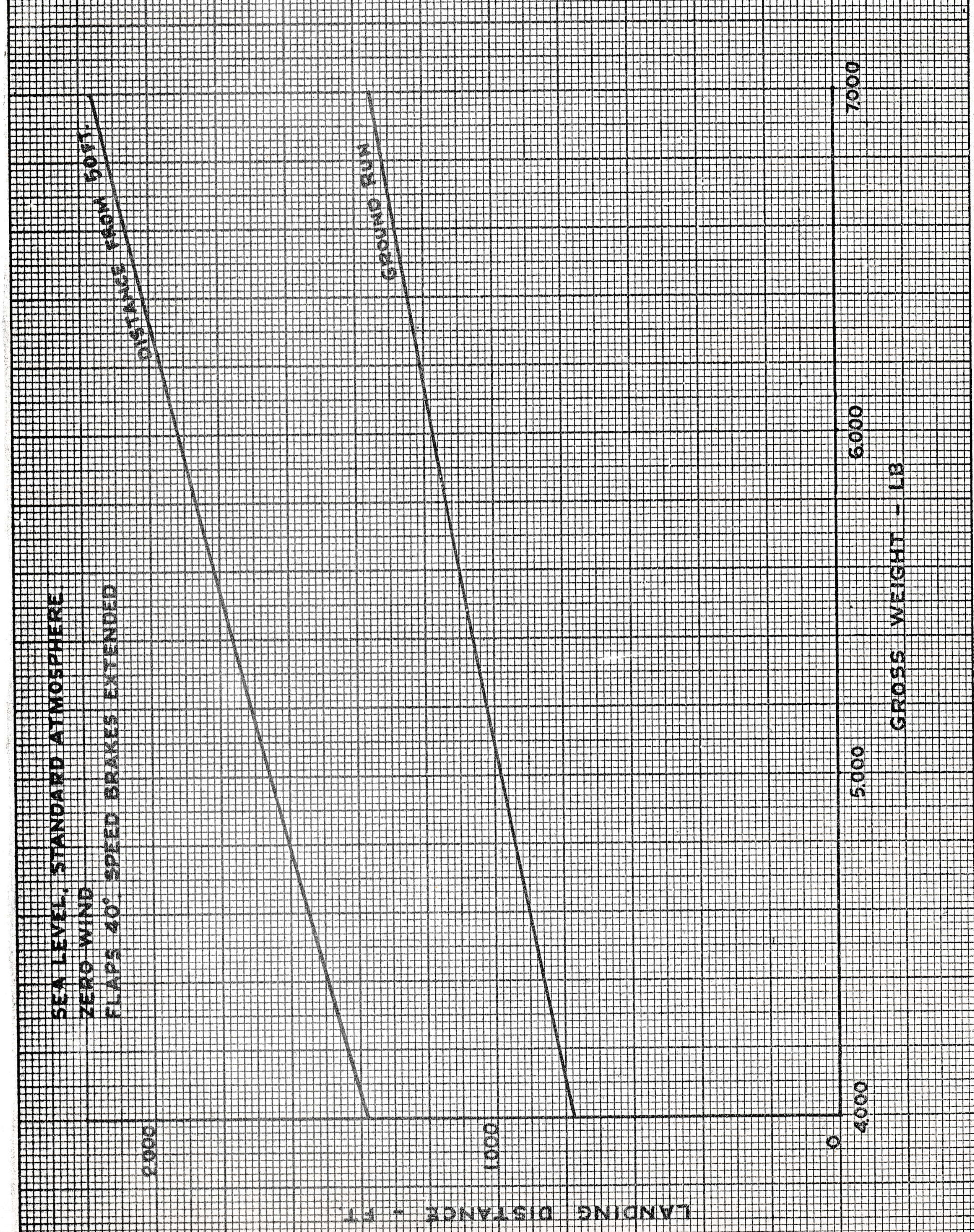
INTERMEDIATE RATING - 17,000 RPM



TAKE-OFF DISTANCE

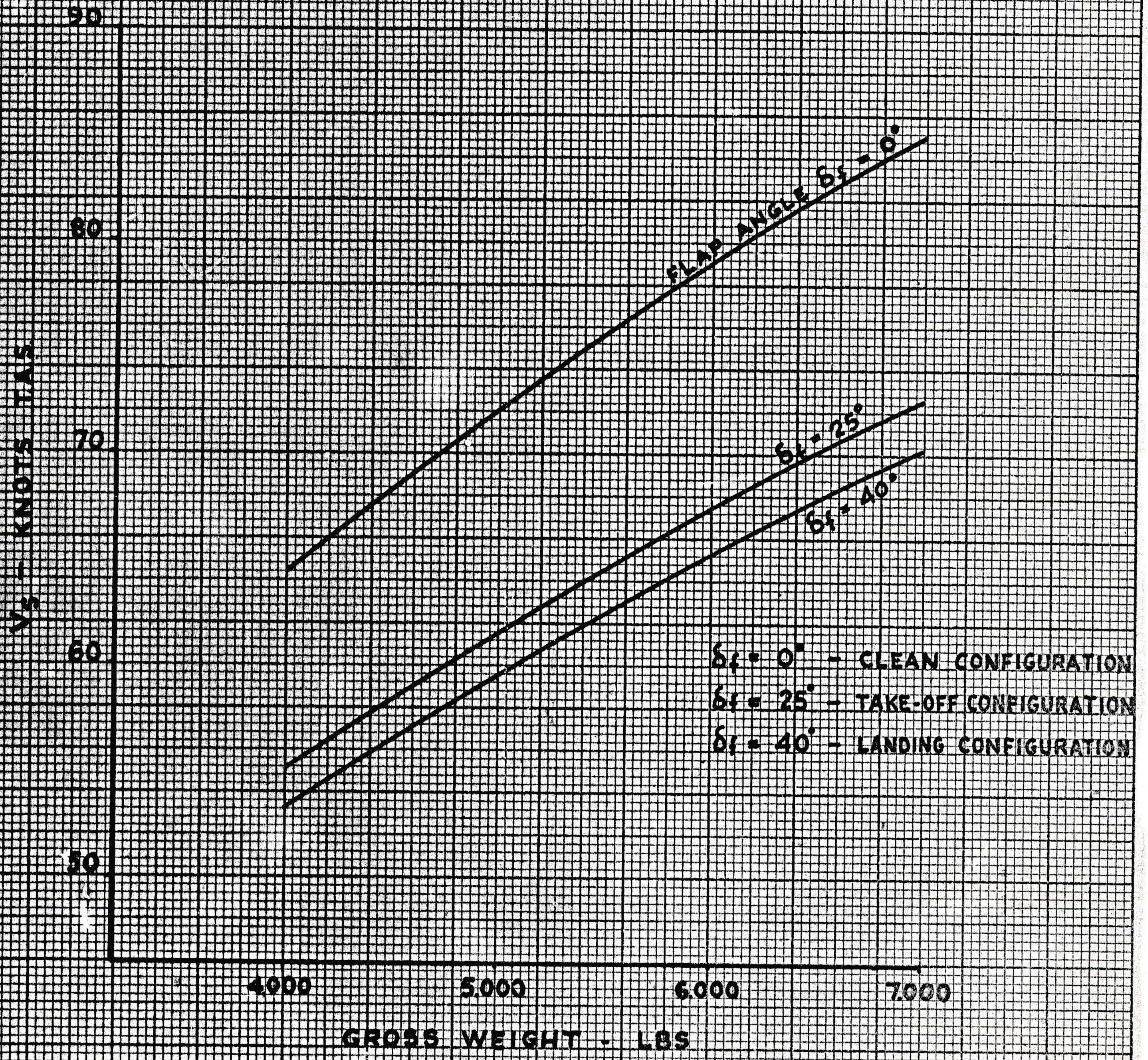


LANDING DISTANCE



STALLING SPEEDS

SEA LEVEL IDLING THRUST



CONFIDENTIAL

GROUP WEIGHT STATEMENT

ESTIMATED - ~~CALCULATED - ACTUAL~~

(Cross out those not applicable)

CONTRACT NO. ______

AIRPLANE, GOVERNMENT NO. ______

AIRPLANE, CONTRACTOR NO. CL-41-1

MANUFACTURED BY CANADAIR LIMITED

		MAIN	AUXILIARY
ENGINE	MANUFACTURED BY	ROLLS-ROYCE	
	MODEL	RB-108	
	NO.		
PROPELLER	MANUFACTURED BY		
	DESIGN NO.		
	NO.		

AN-9103-D
NAME
DATE 7 September 1956

GROUP WEIGHT STATEMENT
WEIGHT EMPTY
Para. 313 (Cont'd)

PAGE 18
MODEL CL-41-1
REPORT RD-41-100

No.	Item		Weight
1	WING GROUP		810
2	CENTER SECTION - BASIC STRUCTURE		
3	INTERMEDIATE PANEL - BASIC STRUCTURE		
4	OUTER PANEL - BASIC STRUCTURE (INCL. TIPS LBS.)		
5			
6	SECONDARY STRUCTURE (INCL. WINGFOLD MECHANISM LBS.)		
7	AILERONS (INCL. BALANCE WEIGHT LBS.)		
8	FLAPS - TRAILING EDGE		
9	- LEADING EDGE		
10	SLATS		
11	SPOILERS		
12	SPEED BRAKES		
13			
14			
15	TAIL GROUP		190
16	STABILIZER - BASIC STRUCTURE		
17	FINS - BASIC STRUCTURE (INCL. DORSAL LBS.)		
18	SECONDARY STRUCTURE (STAB. & FINS)		
19	ELEVATOR (INCL. BALANCE WEIGHT LBS.)		
20	RUDDERS (INCL. BALANCE WEIGHT LBS.)		
21			
22			
23	BODY GROUP		910
24	FUSELAGE OR HULL - BASIC STRUCTURE		
25	BOOMS - BASIC STRUCTURE		
26	SECONDARY STRUCTURE - FUSELAGE OR HULL		
27	- BOOMS		
28	- SPEEDBRAKES		
29	- DOORS, PANELS & MISC.		
30			
31	ALIGHTING GEAR GROUP - LAND (TYPE:)		300

No.	LOCATION	WHEELS, BRAKES TIRES, TUBES, AIR	STRUCTURE	CONTROLS		
34	Main				210	
35	Nose				90	
36						
37						
38						
39						

No.	Item		
40	ALIGHTING GEAR GROUP - WATER		

No.	LOCATION	FLOATS	STRUTS	CONTROLS		
42						
43						
44						
45						

No.	Item		Weight
46	SURFACE CONTROLS GROUP		104
47	COCKPIT CONTROLS		
48	AUTOMATIC PILOT		
49	SYSTEM CONTROLS (INCL. POWER & FEEL CONTROLS LBS.)		
50			
51	ENGINE SECTION OR NACELLE GROUP		38
52	INBOARD		
53	CENTER		
54	OUTBOARD		
55	DOORS, PANELS & MISC.		
56			
57	TOTAL (TO BE BROUGHT FORWARD)		2352

CONFIDENTIAL

AN-9103-D
NAME
DATE 7 September 1956

GROUP WEIGHT STATEMENT
WEIGHT EMPTY
Para 313 (Cont'd)

1	PROPULSION GROUP					692
2		AUXILIARY		MAIN		
3	ENGINE INSTALLATION				408	
4	AFTERBURNERS (IF FURN. SEPARATELY)					
5	ACCESSORY GEAR BOXES & DRIVES				22	
6	SUPERCHARGERS (FOR TURBO TYPES)					
7	AIR INDUCTION SYSTEM				49	
8	EXHAUST SYSTEM				67	
9	COOLING SYSTEM					
10	LUBRICATING SYSTEM					
11	TANKS					
12	COOLING INSTALLATION					
13	DUCTS, PLUMBING, ETC.					
14	FUEL SYSTEM				125	
15	TANKS - PROTECTED					
16	- UNPROTECTED			65		
17	PLUMBING, ETC.			60		
18	WATER INJECTION SYSTEM					
19	ENGINE CONTROLS				21	
20	STARTING SYSTEM					
21	PROPELLER INSTALLATION					
22						
23						
24	AUXILIARY POWER PLANT GROUP					
25	INSTRUMENTS & NAVIGATIONAL EQUIPMENT GROUP					105
26	HYDRAULIC & PNEUMATIC GROUP					98
27						
28						
29	ELECTRICAL GROUP					245
30						
31						
32	ELECTRONICS GROUP					80
33	EQUIPMENT					
34	INSTALLATION					
35						
36	ARMAMENT GROUP (INCL. GUNFIRE PROTECTION LBS.)					
37	FURNISHINGS & EQUIPMENT GROUP					217
38	ACCOMMODATIONS FOR PERSONNEL					
39	MISCELLANEOUS EQUIPMENT					
40	FURNISHINGS					
41	EMERGENCY EQUIPMENT					
42						
43	AIR CONDITIONING & ANTI-ICING EQUIPMENT GROUP					87
44	AIR CONDITIONING					
45	ANTI-ICING					
46						
47	PHOTOGRAPHIC GROUP					
48	AUXILIARY GEAR GROUP					
49	HANDLING GEAR					
50	ARRESTING GEAR					
51	CATAPULTING GEAR					
52	ATO GEAR					
53						
54						
55	MANUFACTURING VARIATION					
56	TOTAL FROM PG. 2					2352
57	WEIGHT EMPTY					3876

CONFIDENTIAL

AN-9103-D

NAME

DATE 7 September 1956

GROUP WEIGHT STATEMENT
USEFUL LOAD & GROSS WEIGHT

PAGE 20
MODEL CL-41-1
REPORT RD-41-100

1 LOAD CONDITION						
2						
3 CREW (NO. 2)			400			
4 PASSENGERS (NO.)						
5 FUEL	Type	Gals.				
6 UNUSABLE						
7 INTERNAL		252	1965			
8						
9						
10 EXTERNAL						
11						
12 BOMB BAY						
13						
14 OIL			9			
15 TRAPPED						
16 ENGINE						
17						
18 FUEL TANKS (LOCATION)						
19 WATER INJECTION FLUID (GALS)						
20						
21 BAGGAGE						
22 CARGO						
23						
24 ARMAMENT						

25 GUNS (Location)	Fix. or Flex.	Qty.	Cal.				
26							
27							
28							
29							
30							
31							
32 AMMUNITION							
33							
34							
35							
36							
37							
38							

39 INSTALLATIONS (BOMB, TORPEDO, ROCKET, ETC.)				
*40 BOMB OR TORPEDO RACKS				
41				
42				
43				
44				
45				
46 EQUIPMENT				
47 PYROTECHNICS				
48 PHOTOGRAPHIC				
49				
*50 OXYGEN				
51				
52 MISCELLANEOUS				
53				
54				
55 USEFUL LOAD	2374			
56 WEIGHT EMPTY	3876			
57 GROSS WEIGHT	6250			

3.1.4 Centre of Gravity Locations

Take-off

Full fuel and two crew(1)	22.0% M.A.C.
Full fuel and one crew	24.4% M.A.C.

Landing

Zero fuel and two crew	23.2% M.A.C.
Zero fuel and one crew(2)	26.7% M.A.C.

Notes:-

(1) Most forward attainable centre of gravity.
(2) Most aft attainable centre of gravity.
(3) Above data correspond to landing gear in up position. Lowering landing gear moves C.G. aft by 0.4% M.A.C.

3.1.5 Areas

Wing area, total, including ailerons flaps and 36 square feet of fuselage	220 sq.ft.
Wing flap area, total	28 sq.ft.
Aileron area, total	17 sq.ft.
Horizontal tail area, total	52.0 sq.ft.
Stabilizer (to elevator hinge) including 6.1 square feet of fuselage and contained elevator balance	36.6 sq.ft.
Elevator aft of hinge including tabs	15.4 sq.ft.
Vertical tail area, total	23.9 sq.ft.
Rudder aft of hinge including tabs	7.0 sq.ft.

3.1.6 Dimensions and General Data

Wing

Span	36.33 ft.
Chord (root)	97.0 inches
Chord (tip)	48.5 inches
Mean aerodynamic chord	75.45 inches
Airfoil (root)	NACA 63A014
Airfoil (tip)	NACA 63A212
Incidence (root to fuselage reference line)	3°
Incidence (tip to fuselage reference line)	1.5°
Sweepback (at 35% chord)	0°
Dihedral	4°
Aspect ratio	6.0
Ailerons (span % of wing semi span)	38%
Chord (average % of wing chord)	25%
Speed brakes (total projected)	3.0 sq.ft.

F.5904 REV.4/55

3.1.6 (Cont'd)

Tail

Horizontal

Span	183.5 inches
Chord (M.A.C.)	42.39 inches
Airfoil	NACA 63A010
Incidence (to fuselage reference line)	0°
Sweepback - leading edge	12°
Dihedral	0°
Aspect ratio	4.5

Vertical

Airfoil	NACA 63A010
Sweep of leading edge	18.5°
Aspect ratio	1.45

Height

Over highest fixed point of airplane	143 inches
Over highest part of tail	143 inches
Height in hoisting attitude (wheels in lowered position)	149 inches

Length (maximum)

Distance from 25% M.A.C. wing to 25% M.A.C. horizontal tail	184 inches
Distance from 25% M.A.C. wing to 25% M.A.C. vertical tail	153 inches

Angles

Angle between fuselage reference line and wing zero lift line	3°
Ground angle	14° 10'

Wheel Size

Main wheels	20 x 4.4
Nose wheel	16 x 5.8

3.1.6 (Cont'd)

Tire Size

Main wheels	20 x 4.4
Nose wheel	16 x 5.8
Tread of Main wheel	149 inches
Base of wheel	114 inches

Vertical travel of axle from extended to fully compressed:-

Main wheels	8.0 inches
Nose wheel	5.5 inches

3.1.7 Control Surface and Corresponding Control Movements

Rudder - 25° right, 25° left
Rudder pedals - 3.25 inches forward, 3.25 inches aft
Rudder pedal adjustment - 3.0 inches forward, 4.0 inches aft

Elevator - 25° above, 10° below

Elevator control stick, 9.0 inches aft, 5.0 inches forward

Elevator tab - 5° above, 20° below

Aileron - 16° above, 16° below
Aileron control stick - 7.0 inches right, 7.0 inches left
Aileron tab - 15° above, 15° below

F.5904 REV.4/55

3.2 General

3.2.1 General Interior Arrangement - - A side by side seating arrangement for a crew of two (2) shall be provided. The cockpit shall incorporate a standard type dual control arrangement utilizing stick type controls for the crew. A fully transparent canopy shall enclose the cockpit. The crew seats shall be spaced at 26 inch centres.

3.2.2 Materials & Standard Parts

3.2.2.1 Materials shall conform to applicable specifications as specified herein and shall be selected in accordance with ANA Bulletin No. 143.

3.2.2.2 Standard parts used in the construction of the airplane shall be selected in the following order of procedure:-

1) Standard parts defined by Canadian Government for aircraft use.
2) United States Military or Air Force / Navy Standard parts.
3) Standard parts issued by industrial associations, committees and technical societies listed in CAP 479.
4) Contractor's standard parts.
5) Commercial standard parts.

3.2.3 Workmanship - - The workmanship shall conform to high grade aircraft practice.

3.2.4 Production, Maintenance & Repairs

3.2.4.1 The design of the airplane shall be such as to facilitate high quantity production. Emphasis shall be given to sub-assembly breakdowns wherever possible.

3.2.4.2 Access provisions throughout the airplane shall be such as to promote ease of maintenance.

3.2.4.3 Consideration shall be given throughout the design to ease of replacement and repair of damaged parts

3.2.5 Interchangeability and Replaceability - - The component parts of the airplane shall be designed to be interchangeable or replaceable in accordance with the definitions of specification MIL-1-8500.

3.2.6 Finish -- The finish of the airplane shall be in accordance with Canadair Specification.

3.2.7 Identification Markings and Color Scheme -- The identification markings and finish of the airplane shall be in accordance with RCAF requirements.

3.2.8 Extreme Temperature Operation -- The airplane and the aeronautical equipment included therein shall be constructed so that it will function satisfactorily in performing its intended mission at all surface temperatures within the range of -50°C to +40°C.

3.2.9 Climatic Conditions -- The airplane and its equipment shall not be unduly affected by dust, aridity, humidity or precipitation extremes encountered in the temperature range of paragraph 3.2.8, and shall be capable of transfer from one climate to another without penalty of extensive modification and adjustment.

3.2.10 Lubrication -- Lubrication of the airplane shall conform to the requirements of MIL-L-6880.

3.2.11 Equipment Installation

3.2.11.1 Armament -- No armament shall be installed. Space provision shall be made for the following:-

Gun Camera 1

3.2.11.2 Communication & Navigation Equipment -- ARC Type 12 VHF Communication equipment and a Radio Compass shall be provided as listed in Appendix 1.

3.2.11.3 Flight Instruments -- The following flight and navigation instruments shall be installed:-

2 altimeters
2 airspeed indicators
2 gyro horizon indicators
2 rate of climb indicators
2 turn and bank indicators
1 accelerometer
1 clock
1 machmeter
2 integrated destination indicators
1 standby compass

3.2.11.4 Night Flying Equipment -- All equipment necessary for night flying, including external and cockpit lighting, shall be installed as noted in Appendix 1, and as otherwise indicated in this specification.

3.2.11.5 Pyrotechnic Equipment -- Not applicable.

3.2.11.6 Radar Equipment -- Not applicable.

3.2.11.7 Equipment and Furnishings -- The equipment and furnishings specified in Appendix 1 shall be installed.

3.2.12 Crew -- The normal crew shall consist of the following:-

1 student pilot

1 instructor pilot

It shall be possible to fly the airplane solo from the left (student) or right hand (instructor) seat.

3.3 Aerodynamics

3.3.1 General -- The general aerodynamic design of the airplane shall be directed to the achievement of the greatest possible performance range. The aerodynamic design for maximum performance shall not reduce or compromise the effectiveness of the airplane as a pilot trainer. Careful attention shall be given to the overall form of the fuselage, canopy, engine air inlets and intersecting surfaces to avoid unfavorable effects at all speeds and during manoeuvers. The required aerodynamic cleanness shall be achieved by utilizing high quality aircraft construction consistent with the requirement of hard useage and minimum attention. The control system design shall be conventional and shall provide the required manoeuverability throughout the speed range without the introduction of hydraulic, electrical or such devices.

3.3.1.1 Stall Characteristics -- Clear and distinct stall warning shall be apparent to the pilot prior to the actual stall by the required speed increment. The stall shall be characterized by a mild downward pitch with little, or no, roll or yaw. Normal use of flight controls to prevent complete stall after initial stall warning, shall be possible. The stalling characteristics shall meet the requirement of Specification MIL-F-8785 (ASG).

3.3.1.2 Spin Characteristics -- The airplane shall be designed to meet the spin requirements of Specification MIL-S-25051 for Category 2 airplanes.

3.3.2 Stability and Control

3.3.2.1 General -- The airplane shall possess good handling characteristics in both steady and accelerated flight throughout its required speed, weight and centre of gravity ranges. Stability and control characteristics shall be in accordance with Specification MIL-F-8785 (ASG) for Class 1 and 111 airplanes.

3.3.2.1.1 Aileron Control Effectiveness -- The pb/2V rate of roll criteria shall meet requirements of Specification MIL-F-8785 (ASG) for a Class III airplane.

3.3.2.1.2 Auxiliary Control Devices -- Two speed brakes shall be incorporated to extend the training suitability of the airplane. The pertinent requirements of Specification MIL-F-8785 (ASG) for airplanes with speed brakes shall be satisfied.

3.3.2.2 Centre of Gravity Limits -- The centre of gravity limits for the aircraft shall provide satisfactory stability and control in both steady and manoeuvering flight.

3.4 Structural Design Criteria -- Structural design criteria shall be specified in detail in Canadair Report No. RS-41-100. All limit load factors derived from the criteria below must be multiplied by 1.5 to obtain ultimate loads.

3.4.1 Limit Flight Load Factors

3.4.1.1 Maximum Take-off Gross Weight -- 6250 lb. (Two crew and full fuel)

Maneuver			
Positive	6.67	Negative	2.67
Gust			
Positive	4.75	Negative	2.75

F.5904 REV.4/55
SUBJECT-

CONFIDENTIAL

3.4.1.2 Alternative Take-off Gross Weight -- I and II. Not Applicable

3.4.1.3 Alternative Take-off Gross Weight -- III. (Minimum Flying Weight - 4184lb.)

Gust

Positive 6.93 Negative 4.93

3.4.2 Limit Ground Load Factors

Take-off = 2.0 (zero wing lift)

Landing = 4.0 at ground with associated wing lift of .67

3.4.3 Limit Dive Speed

3.4.3.1 Limit Flap Speed -- 135 knots (fully down).

3.4.3.2 Limit Landing Gear Speed -- 150 knots.

3.4.3.3 Limit Dive Speed -- 500 knots (EAS) at Maximum Take-off Gross Weight. Equivalent to M = 0.80 at 3000 feet

3.4.3.4 **Limit Mach Number** -- Operational Aerodynamic Limit - 0.80

3.4.4 Ditching Criteria -- The airplane shall have acceptable ditching and forced landing characteristics.

3.5 Wing Group

3.5.1 Description and Components - - The wing shall consist of three main sections; two removable outer panels immediately outboard of the main landing gear, and a center section permanently attached to the fuselage. The wing shall taper in planform and thickness from root to tip. The wing shall be of single spar stressed skin design. Each outer panel shall include a detachable tip, flap and aileron. Structure for a main alighting gear mountings & gear stowage wells shall be included in the wing center section.

3.5.1.1 Airfoil Section Designation

Root - wing station 0	NACA 63A014
Tip - wing station 218	NACA 63A212

3.5.1.2 Dimensions

Wing area - gross total	220 sq.ft.
Wing area - outboard of fuselage (each)	92 sq.ft.
Wing span	36 ft. 4 in.
Root chord - theoretical	97.0 inches
Tip chord	48.5 inches
Taper ratio	2:1
Incidence - Wing station 0	3°
Incidence - tips	1.5°
Dihedral - Wing station 0 to tip	4°
Sweepback - 35% chord	0°
Spar location	35%
Aspect ratio - geometric	6
Mean aerodynamic chord	75.447 inches

3.5.2 Construction - - The construction of the wing shall be of light alloy formed parts, light alloy skins and extruded sections. Light alloy and steel fittings shall be used for structural attachments. The wing bending moments shall be carried primarily in the single spar. The skin areas forward and aft of the single spar and bounded by the front and rear false spars shall carry a proportion of the air loads and shall provide torsional stability. These skin areas shall be supported by corrugated inner skins and by ribs which shall be used for the distribution of aileron and flap hinge loads. The leading edges and trailing edges shall be cantilevered from the single spar and shall carry their proportion of the air loads.

3.5.2 Construction (Cont'd)
The centre portion of the wing shall be reinforced in the region of the main alighting gear attachments and reinforcement also in the region of the lower skin cut-out for the wheel stowage. The wing drag loads shall be carried in shear to the inboard end rib of the wing centre section, where the shear loads shall be carried by the root attachment fittings of the forward and rear false spars, and the web of the single spar. The wing bending moment shall be carried across the wing centre section by the continuous single spar.

3.5.3 Ailerons -- The ailerons shall be of the sealed type with conventional light alloy single-spar and multi-rib construction. Each aileron shall be attached to the wing panel with two hinge bolts.

Differential motion None

Distance from plane of symmetry to centroid of aileron area = 171 inches.

Type of balance - the ailerons shall be of the internally sealed type with 100% static balance. Aerodynamic balance of 35% shall be provided.

Tab - a spring tab shall be provided on each aileron. A trim tab shall be provided on the right aileron. A "bend" tab shall be provided on the left aileron.

3.5.4 Lift and Drag Increasing Devices -- A single-slotted flap shall form the inboard trailing edge of each wing and shall extend from wing station 23 to wing station 132. It shall provide a total flap area of 14 square feet. Single spar multi-rib light alloy construction shall be used. Each flap shall be attached to the wing by two hinges.

3.6 Tail Group

3.6.1 Description and Components - - The tail group shall consist of a one piece horizontal stabilizer, a two piece elevator, a vertical fin and a rudder. The fin shall house antenna components in a removable tip section. Light alloy sheet and extrusions and light alloy and steel fittings shall be used in the construction of the tail group components.

F. 5904 REV. 4/55

3.6.2 Stabilizer - - The stabilizer shall be of all metal, cantilevered, two spar design with chordwise ribs. The stabilizer shall be attached to the fuselage at four points and shall be removable rearward by disconnection of the elevator controls, fairings, and removal of the attachment bolts.

3.6.3 Elevators - - The two elevator sections shall be of all metal construction with a single spar and chordwise formers. The elevator sections shall be interconnected by a torque tube. The elevator halves shall be attached to the stabilizer by six hinge fittings. A trim tab shall be incorporated in the trailing edge of the right elevator section. A spring tab shall be incorporated in the left elevator. Elevators shall be 100% statically balanced and the aerodynamic balance shall be of the "overhang" type and 30% of the local elevator chord.

3.6.4 Fin - - The fin shall be of all metal cantilevered two spar design with chordwise ribs. The fin shall be attached to the fuselage at three points and shall be removable by disconnection of rudder controls and removal of the attachment bolts. The fin shall include three rudder hinges and a removable plastic tip for antennae components.

3.6.5 Rudder - - The rudder shall be of all metal construction with a single spar and chordwise formers. The rudder shall be 100% statically balanced with no aerodynamic balance. The rudder shall be attached to the fin by three hinge fittings. A "bend" tab shall be provided on the trailing edge of the rudder.

3.7 Body Group

3.7.1 Fuselage

3.7.1.1 Description - - The fuselage shall be of all metal semi-monocoque construction and consist of: a nose section housing the nose landing gear and equipment and an access door; a pressurized cockpit section housing the crew, associated controls, instruments, and a canopy; a center section containing five fuel cells, air ducts, and wing attachments; an engine compartment containing engine, firewalls, engine driven accessories; a rear fuselage section containing the jet pipe, and tail group attachments. The above sections shall form integral parts of a single unit fuselage after completion of final assembly.

3.7.1.2 Construction - - The fuselage shall be constructed from light alloy formed sections and skins, with extruded sections as required. Cutouts, at the cockpit, for engine access and for engine air ducts shall be reinforced. A pressurized cockpit front bulkhead and reinforced longitudinal members shall carry the crew seat rails and restrain forward movement of the fuel cells. The fuselage belly shall be reinforced by members to provide additional protection in "wheels up" landings. The wing panel loads shall be distributed into the fuselage through the spar web attachment bulkhead, and attachment fittings on frames at the wing front and rear false spar locations. The horizontal stabilizers and vertical fin loads shall be distributed into the fuselage by fittings, reinforced frames, and longitudinal members. A bulkhead and longitudinal bracing structure shall be located at the engine trunnion positions and shall carry the thrust and vertical loads from the engine. A windshield structure with flat glass and curved acrylic panels shall be incorporated in the forward portion of the cockpit section. The windshield structure and reinforced members around the cockpit opening shall form the seating for the hinged canopy.

3.7.1.2.1 Canopy - - A canopy structure of extruded and formed sections and two acrylic "blown" panels shall be hinged at the rear and open upwards. Pressure seals shall be attached at the boundary of the canopy. The canopy shall be held in the closed position by interconnected locks at the cockpit sill, and at the windshield center member. The canopy shall be normally opened and closed by an electrical motor and shall be self jettisoning under emergency conditions, after release of the locks, operating mechanism, and rear hinge. The canopy shall be operable and jettisonable from either seat, and operable from outside the airplane. Attention shall be given to canopy operation under low temperature conditions.

3.7.1.3 Crew Stations - - A side by side seating arrangement shall be provided, with entrance and egress accomplished by operating the hinged canopy. A flush step shall be located in either side of the fuselage. The two seats shall be of the upward ejection type, adjustable vertically over a five inch range and equipped with seat belts and shoulder harness. The seats shall conform to MIL-S-9479 and shall be spaced at 26 inch centers and mounted on the rear pressure bulkhead of the cockpit by rails, which shall permit upward movement for ejection. Dual flight instrumentation, with engine instruments centrally grouped, shall be furnished on a hinged, shock-mounted instrument panel below the windshield. The arrangement of the controls for engine, fuel, flaps, landing gear, electrical and electronic equipment, shall be such that the left hand pilot position (student) simulates the cockpit of a single seat fighter airplane. The arrangement of controls and

SUBJECT-

3.7.1.3 (Cont'd)
instruments at the right hand seat (instructor), insofar as essential for efficient instruction, shall duplicate the left seat arrangement Miscellaneous switches and controls which shall be required at the left seat position, shall not be duplicated at the right seat position, provided effective operation can be achieved from that seat without interference to the left seat occupant. (The cockpit arrangement shall be finally determined after construction of mock-ups and R.C.A.F. evaluation). Conventional stick controls, adjustable rudder pedals and trim controls shall be provided. The minimum downward vision over the nose on the ground shall be 12°- 30°. Obstructions to all round vision from either seat shall be reduced to a minimum. It shall be possible to see both wing tips from either seat. The sound level in the closed cockpit shall be at an acceptable standard.

3.7.1.4 Equipment Compartments - - An equipment compartment with a hinged cover shall be provided in the fuselage nose section for electronic, electrical and oxygen equipment. A battery compartment with "pull-out" mounting for the battery, shall be located in the nose section under the equipment compartment. The taxi and landing lights shall be located behind a transparent plastic window in the nose section of the equipment compartment.

3.7.1.5 Speed Brakes - - A speed brake, of 1.50 square feet projected area, shall be located on each side of the rear fuselage. The brakes shall be hydraulically operated. The brakes shall be controlled by an electric switch mounted on the two engine power control levers in the cockpit. The right hand (instructor) switch shall incorporate an override feature to prevent undesirable brake operation by the student (left seat).

3.8 Alighting Gear (Wheel Type)

3.8.1 General Description - - A fully retracting nose wheel type alighting gear with wide wheel base and tread for adequate stability during all ground manoeuvers expected of this type of airplane, shall be provided. The main alighting gear shall retract inboard into the wing center section. The auxiliary (nose) alighting gear shall retract forward into the fuselage nose section below the equipment compartment. The alighting gear shall normally be retracted and lowered by a hydraulic system with emergency lowering by handpump and gravity. Up and down locks, adequately protected to exclude dirt and moisture shall be provided for the three alighting gear units. The auxiliary gear door shall be operated by simple links from the nose gear. The main gear doors shall be operated by hydraulic cylinders independently of the gear retraction cylinders but operating in proper sequence with them. Alighting gear wells in the fuselage and wing shall be sealed from the surrounding structure to facilitate cleaning and maintenance. Towing provisions shall be furnished on

3.8.1 General Description (Cont'd)
the alighting gear to facilitate towing the airplane forward or backward. Jacking pads shall be provided on the auxiliary and main gears.

3.8.2 Main Landing Gear

3.8.2.1 Description - - The main landing gear shall consist of two assemblies (one right and one left hand). Each main gear shall consist of a top end assembly, cantilevering a shock strut with a stroke of 8 inches for drag and vertical loads. A bottom end assembly shall support a cantilevered axle for a single wheel. Torque links shall prevent relative rotation of the shock strut barrels. The main gear assembly shall consist of steel and light alloy forged and machined components. Insofar as possible, the design of the main gear attachments shall preclude application of above normal loads to the primary wing structure.

3.8.2.2 Wheels, Brakes and Brake Controls - - Each main alighting gear shall be equipped with a 20 x 4.4 wheel with heavy duty brakes. The brakes shall be operated hydraulically by toe action at the rudder pedals.

3.8.2.3 Tires - - The tires on the main gear wheels shall be 20 x 4.4 Type VII 10 ply, with a maximum static load capacity of 2650 lb. The tire inflation pressure shall be 105 lb. per square inch.

3.8.2.4 Shock Absorbers - - The main alighting gear shall have an air-oil shock absorber designed in accordance with Specification MIL-S-8552. The stroke shall be determined from limit sinking speed and the deceleration of the aircraft permitted structurally by limit landing load factors. The strut shall be tested in accordance with Specification MIL-T-6053A. The stroke shall be 8.0 inches with maximum static pressure of 540 pounds per square inch.

3.8.2.5 Retracting, Extending and Locking Systems - - Retraction and extension of the main alighting gear shall be accomplished by hydraulic rams. Locking of the gear in the retracted position shall be instituted by the relative position of the gear and the retraction ram. Retraction time shall be 6 seconds with lowering time of 8 seconds. Emergency lowering shall be accomplished by hand pump and gravity. Down locks shall automatically engage with the gears in the full down position.

. . .

3.8.2.6 Doors and Fairings -- The main alighting gear door shall be of robust construction and shall be hinged to the wing structure at its inboard edge. The door shall be operated independently of the main gear by a separate hydraulic cylinder sequenced with the main gear.

3.8.2.7 Inspection and Maintenance -- The main gear components requiring normal maintenance shall be easily accessible and visible from the wheel well. The gear shall be readily removable for replacement or repair.

3.8.3 Auxiliary Landing Gear (Nose)

3.8.3.1 Description -- The auxiliary landing gear shall consist of a single assembly, and retract forward into the nose section of the fuselage. The gear shall consist of a top end assembly, cantilevering a shock strut with a stroke of 5.5 inches for drag and vertical loads. A bottom end assembly shall support a fork and axle structure for a single wheel. Torque links shall prevent relative rotation of the shock strut barrels. The auxiliary gear assembly shall consist of steel and aluminum alloy forged and machined components. As far as possible the design of the auxiliary gear attachments shall preclude application of above normal loads to the primary fuselage structure.

3.8.3.2 Wheels -- The auxiliary landing gear shall be equipped with a 16 x 5.8 wheel.

3.8.3.3. Tires -- The tire on the auxiliary gear wheel shall be 16 x 5.8 Type VI, 10 ply, with a maximum static load capacity of 950 lb. The tire inflation pressure shall be 65 lb. per square inch.

3.8.3.4 Retracting, Extending and Locking Systems -- Retraction and extension of the auxiliary gear shall be accomplished by a hydraulic ram. Locking of the gear in the retracted position shall be instituted by the relative position of the gear and retracting ram. Retraction time shall be 6 seconds, and lowering time 8 seconds. Emergency lowering shall be accomplished by hand pump and gravity. The down lock shall automatically engage with the gear in the full down position.

3.8.3.5 Steering -- Space provisions shall be made for nose gear steering.

3.8.3.6 Doors -- The auxiliary gear doors shall be of robust construction, and shall be operated mechanically by movement of the gear.

3.8.3.7 Inspection and Maintenance -- The auxiliary gear components requiring normal maintenance shall be easily accessible and visible in the lowered position. The gear shall be readily removable for replacement or repair.

3.9 Alighting Gear (Water Type) -- Not Applicable

3.10 Surface Control Systems

3.10.1 Primary Flight Control Systems -- The airplane shall be equipped with dual stick controls and dual rudder pedals, operating the elevator, aileron, and rudder cable systems. Control sticks and rudder pedals shall be on the respective seat center lines. The cables shall be routed along the lower fuselage, with the elevator and rudder cables passing under the wing main spar to the aft portion of the fuselage. The aileron cables shall be routed with the elevator and rudder cables to the wing rear false spar frame, and shall then change direction outboard to pass along the rear false spars of the wing panels and to the aileron operating levers. The fuselage shall be provided with adequate access doors to permit assembly, adjustment, and the inspection of the cables throughout the runs. The cable systems shall be routed around pulleys where change of direction is required, and shall connect as necessary to push-pull tubes at the control surfaces to allow removal of the surfaces without disturbing the control system rigging. A parking lock shall be provided to lock the elevators, rudder and ailerons in neutral and to prevent movement of the power control levers. Control surface stops shall be located at the respective control surfaces, and control system stops shall be located in the cockpit adjacent to the respective control components. Control system adjustment shall be by turn-buckles and screwed end cable adjusters.

3.10.1.1 Flight Station Controls -- The dual control sticks shall be interconnected by push-pull tubes, and the rudder pedal assemblies through common torque tubes, to achieve proper co-ordination of the appropriate control surface. The rudder pedals shall be adjustable in pairs and a total adjustment travel of seven inches in the fore and aft directions shall be provided.

3.10.1.2 Aileron System -- Control motion shall be transmitted from the control stick through push-pull tubes, cables , and levers to the right and left ailerons. Ready accessibility shall be provided to the aileron control system through the major portion of its routing by provision of access doors or removable covers.

3.10.1.3 Rudder System -- Control motion shall be transmitted from the rudder pedals through push-pull tubes, torque tubes, cables and levers to the rudder, Ready access shall be provided to the rudder control system through the major portion of its routing by provision of access doors, removable covers and detachable fairings.

3.10.1.4 Elevator System -- Control motion shall be transmitted from the control stick through push-pull tubes, cables and levers to the elevators. Ready access shall be provided to the elevator control system through the major portion of its routing by provision of access doors, removable covers and detachable fairings.

3.10.1.5 Stabilizer System -- A fixed stabilizer shall be used.

3.10.2 Secondary Flight Control System

3.10.2.1 Lift and Drag Increasing Devices -- The wing flaps shall be hydraulically operated. Actuation shall be accomplished by moving either of the interconnected flap levers to the appropriate position indicated on the control quadrant.

This control action, transmitted electrically to a hydraulic selector valve, shall be directly connected to the flap. Extension of the actuator shall cause rotation of the flap around an external hinge to the flap extended position.

The right and left hand portions of the flap shall be linked mechanically by means of an interconnected torque tube, and shall ensure synchronized operation. Movement of the torque tube shall transmit flap position to the selector valve, and shall close the valve when the flaps are extended to the desired position.

3.10.2.2 Speed Brakes -- Dual speed brakes, hydraulically actuated, shall be located one on each side of the rear fuselage.

Two hydraulic actuating cylinders shall be provided, one at each brake. The actuating cylinder shall be directly connected to the speed brake. The hydraulic cylinders shall be controlled by a

F.5904 REV.4/55

3.10.2.2 Speed Brakes (Cont'd)
solenoid operated selector valve which in turn shall be connected by an electrical switch mounted on the engine power control lever at each control quadrant.

3.10.2.3 Trim Tab Control Systems - - The right elevator trim tab shall be operated by an electric actuator directly connected to the trim tab, the actuator shall be energized through a switch mounted in the top of each control column. The aileron trim tab shall be operated by an electric actuator directly connected to the trim tab. The actuator shall be energized through a switch mounted in the top of each control column.

3.10.2.4 Automatic Flight Control System - - Not applicable.

3.11 Engine Section or Nacelle Group

3.11.1 Description and Components - - A single turbojet engine shall be arranged within the center fuselage section, immediately to the rear of the wing panel attachment structure. A left and a right hand engine air intake duct, with air entry forward of the wing root leading edge, shall pass into the fuselage immediately to the rear of the cockpit rear pressure bulkhead and join together to form a single air inlet duct immediately forward of the engine. The external fairing sections of the engine air ducting shall be continued to the rear to form a fairing at the wing/fuselage intersection, and shall terminate at approximately the wing root trailing edge. This fairing shall be attached to the wing panels with easily removable fastenings.

3.11.2 Engine Mounts - - The engine shall be supported by a simple tubular structure attached to a main fuselage frame, and steadied by a forward engine steady link.

3.11.3 Tail Pipe - - The tail pipe shall be contained within the rear fuselage section. The tail pipe attachments to the engine and fuselage shall facilitate ready removal, and the shroud attachment to the fuselage shall be removable for tail pipe extraction from the rear.

3.11.4 Firewalls -- Stainless steel (or equivalent) firewalls, fireseals, or thermal blankets shall be used as follows:-

a) Immediately forward of the engine.
b) At the rear end of the engine compressor and engine accessories section (zone I).
c) On all inner surfaces of the fuselage structure over the engine compressor section length (zone II).
d) Blankets shall be used around the turbine section of the engine.
e) Blankets shall be used around the tail pipe.

3.12 Propulsion

3.12.1 General Description and Components -- A turbojet engine, fully enclosed within the fuselage, shall be provided. A design objective shall be the achievement of maximum engine and engine accessories accessibility, and minimum replacement time. The engine shall be fully controllable from either of the crew positions. A simplified fuel system with all tanks interconnected shall be provided. The engine manufacturer shall supply the engine, furnished with the following items:- a fuel control unit, oil system, oil tank, fuel cooled oil cooler, fuel pump, ignition units, auxiliary gearbox drive flange, tachometer accessory drive, oil pressure connection, and compressor air bleed fittings.

3.12.2 Main Propulsion Unit

Type: Multi stage axial flow turbojet with annular combustor

Manufacturers Specification: Rolls Royce Limited RB-108

3.12.3 Auxiliary Propulsion Units -- Not Applicable

3.12.4 Engine Driven Accessories

3.12.4.1 Description and Components -- The engine shall incorporate a drive coupling for an accessory gear box, and an accessory drive to mount an electric tachometer.

3.12.4.2 Remote Gear Boxes and Drives -- A gear box with shaft drive from the engine shall be mounted on the airframe, and shall accommodate a 28 volt D.C. starter-generator and a hydraulic pump.

3.12.5 Air Induction System

3.12.5.1 Description and Components -- A right and left hand inlet with a boundary layer deflector shall be provided forward of the wing leading edge.

3.12.5.2 Air Intakes -- Air for engine accessories cooling shall be obtained from inlets in the fuselage surface.

3.12.5.3 Ice Protection System -- Not Applicable

3.12.5.4 Dust Protection System -- Not Applicable.

3.12.5.5 Intercoolers -- Not Applicable

3.12.6 Exhaust System

3.12.6.1 Description and Components -- The exhaust system shall consist of a tail pipe extending from the engine to the fuselage tail shroud. The tail pipe shall be lagged over its whole length.

3.12.7 Cooling System

3.12.7.1 Description and Components -- Inlets in the fuselage surface shall supply air for engine accessories cooling.

3.12.8 Lubrication System

3.12.8.1 Description and Components -- A self-contained lubrication system including tank and integral cooler shall be supplied with the power unit. A filler and dip stick shall be provided. The tank capacity shall provide for 5 Imp. pints of useable oil.

3.12.8.2 Piping and Fittings -- All piping and fittings shall be in accordance with the requirements of HIAD Section D3-423.

3.12.8.3 Temperature and Surge Control -- Not Applicable

3.12.8.4 Dilution and Warm Up Provisions -- Not Applicable

3.12.8.5 Shut-off Valve and Control -- Not Applicable

3.12.8.6 Deaeration Provisions -- Deaeration provisions shall be incorporated in the oil tank by the power unit manufacturer.

F. 5904 REV. 4/55

SUBJECT-

CONFIDENTIAL

3.12.9 Fuel System

3.12.9.1 Description and Components -- The fuel system shall consist of five (5) fuel cells, interconnected to provide single tank operation. Two boost pumps, each of sufficient capacity for normal engine requirements, shall be provided, one in the forward cell and one in a rear cell.

3.12.9.2 Pumps -- Two boost pumps shall be installed and shall incorporate a negative 'g' device for inverted flight conditions.

3.12.9.3 Tanks (fixed) -- Five (5) cells of the crash resistant type shall be installed with a useable capacity of 252 imperial gallons. One cell shall be installed in the fuselage immediately to the rear of the rear cockpit pressure bulkhead. Two cells, one on the port side and one on the starboard side shall be installed in the fuselage between the first fuel cell and the wing spar attachment bulkhead. Two cells, one on the port side and one on the starboard side shall be installed in the fuselage, immediately aft of the wing spar attachment bulkhead.

3.12.9.4 Tanks (Droppable) -- Not Applicable

3.12.9.5 Vent System -- All fuel tanks shall be installed with interconnected vents and the system shall incorporate a vent, shut-off valve, and a siphon breaker valve.

3.12.9.6 Piping and Fittings -- All piping and fittings shall be in accordance with HIAD Section D3-423.

3.12.9.7 Valves -- A fuel shut-off valve shall be installed in the fuel line between the boost pumps and the engine.

3.12.9.8 Strainers and Filters -- A fuel filter shall be installed on the engine and supplied by the engine manufacturer. A fuel strainer shall be installed at the refuelling point.

3.12.9.9 Quantity Gauge and Flowmeter -- A fuel flowmeter transmitter shall be installed in the fuel line adjacent to the boost pumps. A fuel gauging system of the capacitance type shall be installed in the fuel system.

3.12.9.10 Drainage Provisions -- A fuel drainage valve shall be installed in the boost pumps.

3.12.9.11 Fuel Vapor Inertion -- Not Applicable

3.12.9.12 Fuel Evaporation Control -- Not Applicable

3.12.9.13 Refuelling Provision -- A flush type, gravity filler cap assembly shall be provided in the rear port fuel tank, and shall feed fuel to all fuel tanks.

3.12.9.14 Defuelling Provisions -- A defuelling valve shall be provided to drain fuel from the complete fuel system.

3.12.10 Water Injection System -- Not Applicable

3.12.11 Propulsion System Control --

3.12.11.1 Description and Components -- A power control lever and a high pressure cut-off lever shall be provided at each crew position.

3.12.11.2 Engine Control System -- A power control lever for the engine shall be located on the left side console at each crew position A mechanical push-pull tube linkage, with each throttle movement co-ordinated, shall connect each control lever to the engine fuel control valve.

3.12.11.3 Induction Air Control -- Not Applicable

3.12.11.4 Starter Controls -- A switch, of the momentary "on" type with guard shall be provided to energize a relay for starter engagement.

3.12.11.5 Propeller Controls -- Not Applicable

3.12.11.6 Cooling Air Controls -- Not Applicable

3.12.11.7 Water Injection Controls -- Not Applicable

3.12.12 Starting System

3.12.12.1 Description and Components -- An electric starter/generator combination shall be provided. The starter shall be controlled by a switch located on the center console.

3.12.13 Propeller -- Not Applicable

3.12.14 Rocket Propulsion System -- Not Applicable

3.13 Auxiliary Power Plant - - Not Applicable

3.14 Instruments and Navigational System

3.14.1 Instruments - - Instruments shall be provided for day, night and instrument flying.

3.14.1.1 Pitot Tube - - A pitot tube and a flush static port system shall be provided.

3.14.1.2 Flight Instruments - -

a) The following flight instruments shall be provided on the left side of the instrument panel:-

Altimeter
Air Speed Indicator
Gyro Horizon Indicator
Rate of Climb Indicator
Turn and Bank Indicator
Accelerometer
Machmeter
Clock
Flap Position Indicator
Landing Gear Position Indicators

b) The Following instruments shall be provided on the right side of the instrument panel:-

Altimeter
Air Speed Indicator
Gyro Horizon Indicator
Rate of Climb Indicator
Turn and Bank Indicator

c) The following instruments shall be provided on the instrument panel and shall be easily readable from right or left crew seat:-

Cabin Pressure Indicator
Loadmeter
Hydraulic Pressure Indicator
Oxygen Quantity Indicator

3.14.1.3 Engine Instruments -- The following engine instruments shall be positioned in the center portion of the instrument panel:-

Tachometer
Fuel Quantity Indicator
Fuel Flow Indicator
Tail Pipe Temperature Indicator

3.14.2 Navigational Instruments -- The following navigational instruments shall be provided in the cockpit within each basic flight instrument panel.

Integrated Destination Indicator
(incorporating radio compass)
Standby Compass (Positioned on centre member of windshield)

3.14.3 Installation -- The arrangement of the instruments shall be in accordance with the specific requirements of the RCAF.

3.15 Hydraulic and Pneumatic Systems

3.15.1 Hydraulic System

3.15.1.1 Description and Components -- The hydraulic system shall be designed and installed in accordance with Specification MIL-H-5440. The system shall be of the closed center constant pressure type with a nominal operating pressure of 3000 PSI. The system shall be designed to operate the following sub-systems:-

Landing Gear
Landing Flaps
Speed Brakes
Wheel Brakes (Boost only)
Main Landing Gear Doors

The main hydraulic circuit shall have as a pressure source a variable displacement pump, mounted on and driven from the engine driven accessories gear box. The pump shall be supplied from a reservoir which shall be located to supply an adequate static head of fluid to the power driven pump and hand pump. An emergency handpump, accessible to either crew member, shall be provided. A line type filter and a reservoir filter shall be provided. Fittings shall be provided, at an accessible location, for ground test purposes. Standard bleeder valves shall be provided in easily accessible locations. The actuators shall be adequately protected and shall be accessible for easy maintenance.

F.5904 REV.4/55
SUBJECT-
CONFIDENTIAL

3.15.1.2 Summary of Actuated Items

a) Main Gear - - Control actuation shall operate a valve permitting flow from the pump through the valve to the gear actuating cylinder. Control Actuation shall operate "up" and "down" locks. Provision shall be made to prevent retraction of gear when the airplane is on the ground.

b) Landing Flaps - - Control actuation shall operate a pre-select control valve which shall permit flow to the actuating cylinders. The valve shall allow an intermediate flap position, "full up" and "full down".

c) Speed Brakes -- Control actuation shall operate a valve permitting flow to the actuating cylinders.

d) Main Landing Gear Doors - - Control actuation of the main landing gear shall operate the main gear door cylinder which shall open or close the door in proper sequence with the main gear movement.

3.16 Electrical System

3.16.1 Description - - The electrical system shall be a 28 volt DC single wire system. The system shall contain a single bus powered by three sources; battery, generator, and external power.

3.16.2 Electrical Power Supply

3.16.2.1 A 250 ampere starter generator shall be installed on the engine gear box and shall be readily accessible and adequately cooled.

3.16.2.2 Generator Voltage Regulator - - A carbon pile type voltage regulator (17R21) shall be installed in the nose compartment, and shall be easily accessible for adjustment.

3.16.2.3 Relay Switch - Generator Control - - One AN3025-1 generator control relay shall be installed. The relay shall be controlled by a switch located on the center console.

3.16.2.4 Battery - - A 24 volt 36 amp.hour battery (AN3150-2) shall be installed in the nose battery compartment, and shall be installed in a manner to provide ease and rapidity of replacement. A battery relay shall be installed as close as practicable to the battery to isolate the battery from the main bus. The relay shall be controlled by a switch on the center console.

The battery shall be of sufficient capacity to permit ground starting.

3.16.3 Electrical Power Conversion -- One main three phase, 115 volt, 400 cycle, 250 volt-ampere inverter and one spare, three phase 115 volt, 400 cycle, 100 volt ampere inverter shall be installed in the nose compartment. A change -over relay, controlled from the center console switch panel shall be provided to change from main to spare inverter.

3.16.4 Equipment Installation -- The Electrical Equipment shall be installed in accordance with specifications MIL-E-7080 and MIL-E-7563.

3.16.5 Wiring -- The wiring shall conform with MIL-W-5088.

3.16.6 Bonding and Shielding

3.16.6.1 Bonding -- Bonding shall be in accordance with Specification MIL-B-5087

3.16.6.2 Shielding -- Wires and equipment shall be shielded and radio noise filters shall be installed as required, in accordance with Specifications MIL-I-6181B.

3.16.7 Controls

3.16.7.1 Switches -- The fuel management panel, the starting switch panel, the electrical switch panel, and the miscellaneous switch panel, shall be located on the forward end of the center console. Test switches and landing-taxi light switches shall be located on the left hand console.

3.16.7.2 Circuit Breakers -- Circuit breakers shall be installed on the circuit breaker panel located on the left hand vertical face of the center console.

3.16.7.3 Rheostats -- Rheostats shall be located on the centre console and shall control the instrument panel primary and secondary lighting and console lighting.

3.16.8 Lighting

3.16.8.1 Instrument Lighting -- Lighting of the instruments shall consist of a primary individual instrument red lighting system and a secondary red flood system.

3.16.8.2 Console Lighting -- Control panels on the consoles shall be illuminated by edge lighted panels, to Specification MIL-P-7788.

3.16.8.3 Utility Lights - - Two type C4A utility lights shall be located in the cockpit, one each at the right and left hand consoles.

3.16.8.4 Landing and Taxi Lights - - Two 250 watt lamps shall be installed on the nose of the airplane for landing. One lamp shall be used as a taxi light.

3.16.8.5 Position Lights - - Flashing position lights shall be installed on the wing tips, upper and lower fuselage, and rear fuselage tail fairings.

3.16.8.6 Passing Light - - A 50 watt red passing light shall be installed in the nose.

3.16.8.7 Landing Gear Down - Locked Position External Light - - Three indicator lights shall be provided, one near each gear, visible to a ground observer. The circuit shall be powered by the lighting of the position lights and the individual lights shall be illuminated when the respective gear is down and locked.

3.16.9 Ignition and Starting Control System - - A starter controller panel shall be located in the forward end of the engine bay. The switches for starting control shall be located on the center console.

3.16.10 Receptacles

3.16.10.1 External Power Receptacle - - An external power receptacle shall be installed on the side of the aircraft aft of the wing.

3.16.10.2 Fuel Nozzle Grounding Jacks - - A fuel nozzle grounding jack shall be installed in accordance with A.B.C.

3.16.10.3 Static Ground - - A static ground wire shall be installed on the main landing gear.

3.16.11 Indicators

3.16.11.1 Fire Indicators - - A master fire warning light shall be installed on the upper center portion of the instrument panel.

3.16.11.2 Caution Indicator - - A master caution indicator shall be installed on the upper left hand portion of the instrument panel. An annunciator panel shall be located on the center console. A malfunctioning requiring an indication shall illuminate the master caution indicator and the applicable word warning on the annunciation panel. The master caution indicator can be depressed to reset, leaving the annunciator panel lighted until the malfunction is rectified. Indications on the annunciator panel shall be -

3.16.11.2 Caution Indicator (Cont'd)
Low Fuel Quantity
Low Fuel Pressure
Inverter Failure
Generator Failure
Canopy not locked

3.16.11.3 Warning -- A landing gear warning horn shall be installed in the cockpit. The warning horn shall be sufficiently loud to be heard by the crew when wearing headsets. The horn shall operate when the landing gear is in any position other than down and locked and the power lever is retarded below minimum cruising power. A cut out switch available to the pilot shall enable the horn to be silenced. Advancing the power lever to minimum cruising power shall reset the horn for operation. A warning light shall be installed in the handle of the landing gear lever. This light will be illuminated when the landing gear is in any position other than the one selected or when the power lever is retarded below minimum cruise position and the landing gear is not down and locked.

3.16.11.4 Indicators -- Three landing gear position indicators one for each gear shall be installed on the instrument panel.

3.16.11.5 Meters -- A loadmeter shall be installed on the main instrument panel.

3.16.12 Electrical Drives -- The canopy, elevator and aileron trims, shall be electrically actuated.

3.16.13 Filters (see also paragraph 3.16.6.2) Radio interference filters shall be installed if required.

3.17 Electronics -- The electronic equipment shall be installed by the Contractor in accordance with the Handbook of Aircraft Designers and as hereinafter provided.

3.17.1 Communication Equipment

3.17.1.1 Command Set -- A V.H.F. communications transmitter-receiver equipment shall be installed in the radio bay of the fuselage nose where it shall be readily available through the nose equipment access doors. The control shall be mounted on the radio control pedestal located between the seats. A suppressed type antenna shall be located in the vertical fin so that performance obtained will fulfill the requirements of the radio manufacturer.

F.5904 REV.4/55

3.17.1.2 Liaison Set -- Not Applicable

3.17.1.3 Intercommunication -- A microphone button shall be installed on each power control lever or control stick. Interphone shall be accomplished by placing the V.H.F. channel selector in a "no crystal" position and utilizing the radio side-tone. Alternatively, with the "Hot-Mike" amplifier switch turned "on", it shall be possible to talk to the other crew member without the necessity of pressing the microphone button for each interphone communication.

3.17.1.4 Microphone and Headsets -- Headset-microphone jacks with quick disconnect provisions shall be installed on both seats.

3.17.1.5 Filter Equipment -- Not Applicable

3.17.1.6 Recording Equipment -- Not Applicable

3.17.2 Navigation Equipment

3.17.2.1 Radio Compass -- A radio compass shall be installed in an accessible position in the radio bay of the fuselage nose. Bearing indication shall be presented on the integrated destination indicators. A control panel shall be located in a position accessible to both crew members. Sense antenna shall be located on the underside of the cockpit canopy, loop antenna shall be mounted in the fuselage nose so that performance obtained will fulfil the requirements of the radio manufacturer.

3.17.2.2 Marker Beacon Equipment -- Not Applicable

3.17.2.3 Instrument Approach -- Not Applicable

3.17.2.4 Radio Altimeter -- Not Applicable

3.17.2.5 Radio Range Receiver -- Not Applicable

3.17.2.6 Homing Adapter -- Not Applicable

3.17.2.7 V.H.F. Navigation Receiver -- Not Applicable

3.17.2.8 Distance Measuring Equipment -- Not Applicable

3.17.2.9 Arbitrary Course Computer -- Not Applicable

3.17.3 Radar -- Not Applicable

3.17.4 Electronic Countermeasures -- Not Applicable

3.17.5 Electronic Guidance System -- Not Applicable

3.17.6 Static Dischargers -- Static dischargers shall be installed as required.

3.17.7 Emergency Rescue Transmitter -- Not Applicable

3.17.8 Installation of Electronic Equipment -- Wiring shall be in accordance with Specification MIL-W-5088. All wiring whether shielded or unshielded shall be identified and coded. Frequency placards and holders shall be installed to be easily visible to both crew members. Where practicable it shall be possible to remove or install any unit in the equipment rack without disturbing adjacent equipment or wiring. Adequate provision shall be made for heat dissipation from electronics equipment. Radio interference tests shall be conducted in accordance with Specification MIL-I-5061. Equipment shall be placed in normal operating condition and tested, including necessary flight testing, in accordance with manufacturer's requirements.

3.17.9 Inspection and Maintenance -- Provision shall be made in all cases for the inspection, maintenance, removal and re-installation of electronic equipment.

3.18 Armament -- Not Applicable

3.19 Furnishings and Equipment

3.19.1 Accommodations for Personnel

3.19.1.1 Seats -- Two seats of the upward ejection type shall be installed in the cockpit. The seats shall be adjustable over a 5 inch vertical range. The seats shall be designed for back type parachutes and shall conform to MIL-S-9479.

3.19.1.2 Safety Belts -- A safety belt shall be installed on each seat.

3.19.1.3 Shoulder Harness -- A shoulder harness with inertia reels shall be installed on each seat.

3.19.1.4 Cushions - - Removable bottom cushions shall be provided for each seat.

3.19.2 Miscellaneous Equipment

3.19.2.1 Map Case - - A combination flight report holder and map case shall be installed on the left hand side of the cockpit.

3.19.2.2 Airplane Data Case - - A data case, with space for handbooks etc. shall be installed in the cockpit.

3.19.2.3 Check List Holder - - A check list holder shall be installed in the cockpit on the left side of the instrument panel.

3.19.2.4 Windshield Wipers - - Not Applicable

3.19.2.5 Storage Provisions -- Not Applicable

3.19.2.6 Miscellaneous Stowage - - Stowage shall be provided in the cockpit for two stage lumarith screens and goggles.

3.19.2.7 Emergency Equipment - - A crow bar and stowage shall be provided in the cockpit.

3.19.3 Furnishings

3.19.3.1 Floor Covering - - The floor covering shall consist of light alloy sheets. Metal heel plates shall be provided below the rudder pedals.

3.19.3.2 Insulation - - Not Applicable

3.19.3.3 Upholstery - - Not Applicable

3.19.4 Emergency Equipment - - Not Applicable

3.19.4.1 Fire Detection System - - A fire detection system with instrument panel and console indicator lights shall be installed for the engine and tail pipe bays.

3.19.5 Oxygen Equipment - - An oxygen system shall be installed. One 5 litre liquid oxygen converter, an evaporating coil and relief valve shall be installed in the right side of the nose equipment compartment. 'Oxygen regulators' shall be installed on the left and right hand consoles. An oxygen quantity indicator shall be provided in the instrument panel.

3.19.6 Emergency Rescue Equipment

3.19.6.1 Parachutes - - Provisions shall be made in the crew seats for back type parachutes.

3.19.6.2 First Aid Kit -- Not Applicable

3.20 Air Conditioning and Anti-Icing Equipment

3.20.1 Air Conditioning

3.20.1.1 In Flight Air Conditioning - - Heating, cooling and pressurization of the cockpit compartment shall be provided. The minimum cockpit temperature shall be +45°F for all operating flight conditions. The air for the cockpit air conditioning shall be taken from the engine compressor and shall pass through a primary and a secondary heat exchanger for cooling to the required temperature. The temperature of the air entering the cockpit shall be automatically controlled by a temperature selector control in the cockpit.

3.20.1.2. Pressurisation - - The cockpit shall not be pressurised from sea level to 8000 feet. From 8000 feet to 35,000 feet the cockpit pressure shall be progressively increased until the inside/outside air pressure differential reaches 3.0 psi. Air pressure in excess of this differential pressure shall be relieved through a pressure regulator and a relief valve to the outside atmosphere. A tapping from the primary air exchanger manifold shall supply air for cockpit canopy sealing.

3.20.1.3. Occupied Compartments - - The cockpit section shall be as described in 3.20.1.2. The air conditioning controls shall be located in the center cockpit console.

3.20.1.4. Other Compartments - - The cockpit shall be the only portion of the airplane air conditioned in flight.

3.20.1.5. Ground Air Conditioning - - Heating and cooling of the cockpit shall be provided when the airplane is on the ground and with the engine operating.

3.20.2. Anti-Icing

3.20.2.1. Anti-Icing of Non-Transparent Areas -- Not Applicable.

3.20.2.2. Anti-Icing, Defrosting and Defogging of Transparent Areas - - Windshield and canopy transparent areas shall be defrosted. A tapping from the primary air exchanger manifold shall supply heated air for windshield and canopy defrosting.

3.21. Photographic - - Not Applicable

3.22. Auxiliary Gear

3.22.1. Towing Gear - - Provisions shall be made on the nose alighting gear to accommodate a tow bar for towing or pushing. Provisions shall be made on each main alighting gear to facilitate either pushing or towing the airplane.

3.22.2. Jacking Provisions - - Jacking provisions shall be in accordance with specification MIL-J-8711. Jack pads shall be located on the main gear axle fittings. Jacking points with removable jack pads shall be provided at the fuselage bulkheads at the wing panel attachments and at the rear fuselage. The jacking point positions shall permit removal of the wing panels and/or the landing gear assemblies when the airplane is raised. The jacking point positions shall permit operation of the landing gears when the airplane is raised.

3.22.3. Mooring Provisions - - Mooring provisions shall be provided.

3.22.4. Hoisting Provisions - - Hoisting provisions shall be provided.

3.22.5. Leveling - - External accessible provisions for measuring and leveling shall be provided.

3.22.6. Covers and Shields

3.22.6.1. Engines - - Not Applicable.

3.22.6.2. Transparent Glass and Plastic Enclosures - - Not Applicable.

3.22.6.3. Wing and Tail - - Not Applicable.

3.22.6.4. Miscellaneous Covers - - Not Applicable.

3.22.6.5. Special Tools - - Not Applicable.

4. Sampling, Inspection and Test Procedures - - To follow.

5. Preparation for Delivery - - To follow.

6. Notes

6.1. Definitions - - Where the phrases "complete provisions for", "structural provisions for" and "space provisions for" are used in this specification. The intent is defined as follows:

6.1.1. Complete Provisions for - - "Complete provisions for" a specific item of equipment or assembly or installation shall mean all supports, brackets, tubes, fittings, electrical wiring, hydraulic lines, etc. have been installed and weight and space allocated so that the equipment can be installed without alteration to the equipment or the airplane and no other parts other than the item itself need be furnished.

6.1.2. Structural Provisions for - - "Structural provisions for" a specific installation shall mean that the primary structure will be structurally adequate for the installation but that brackets, bolt holes, electrical wiring, hydraulic lines, etc. will not be supplied or included as items in the normal weight of the airplane.

6.1.3. Space Provisions for - - "Space provisions for" a specific installation shall mean that space only shall be allocated for the installation and no weight allowance shall be made for the installation in the normal weight of the airplane. ("Space Provisions for" does not imply that "Structural Provisions for" the equipment or installation have been made.)

F.5904 REV.4/55

SUBJECT- APPENDIX I - EQUIPMENT BREAKDOWN - CONFIDENTIAL

I Instrumentation

II Electrical

III Hydraulics

IV Furnishings

A. Cockpit Equipment

B. Oxygen System

C. Heating, Cooling and Pressurization

V Electronics

A. V.H.F. Command Set

B. Interphone

C. Radio Compass

VI Power Plant

A. Engine

B. Fuel System

VII Landing Gear

F.5904 REV.4/55

SUBJECT- I. Instrumentation CONFIDENTIAL

I. Instrumentation

Item No.	Qty.	Description	Mfg.Ident.	Military Ident.	Unit Wt.
1	2	Airspeed indicator Type L7A		MIL-1-5356	
2	2	Gyro horizon Type B/C	Ferranti	6A/1282	
			64/30000		
3	2	Nameplate - Gyro Erection	64/90506	6A/1365	
4	2	Switch - Gyro Erection	B2-7RQIT	5CB/557	
5	2	Rate of climb		MS28049-1	
				MIL-1-7721	
6	2	Turn and bank indicator Type B/C		6A/1299	
7	2	Altimeter indicator		AN5760-4B	
				MIL-A-6863	
8	2	Antac system comprising: Integrated destination indicator	C.D.C.		
9	2	I.D.I. amplifier	C.D.C.		
10	1	Control gyro, Type S3A			
11	1	J2 Flux valve (complete with compensator)	Sperry		
			656520		
12	1	J2 amplifier, Type A2	Sperry		
			653278	6B/1111	
13	1	Accelerometer		MS28025-1	
				MIL-A-5885A	
14	1	Machmeter, T pe A-2B		MIL-M-5388	
15	1	Tachometer, Type E-32A		MIL-I-8407	
16	1	Tachometer generator		MIL-G-6027	
17	1	Exhaust temperature indicator type K-8		MIL-I-5892	
18	1	Fuel flow indicator			
19	1	Fuel flow power unit			
20	1	Mount			
21	1	Fuel flow transmitter			
22	1	Fuel quantity indicator/amp.	Capacitance type		
23	1	Tank unit			
24	1	Hydraulic pressure indicator		MS-28010-5	
				MIL-1-7084	
25	1	Hydraulic pressure transmitter		MS-28005-5	
				MIL-T-5780	
26	1	Cabin pressure indicator		MIL-1-5099	

1. Instrumentation (Cont'd)

Item No.	Qty.	Description	Mfg. Ident.	Military Ident.	Unit Wt.
27	1	Flap position indicator		6A/1349	
				MS-28003-1	
				MIL-1-7067	
28	1	Flap position transmitter Type A4		6A/1221	
				AN5786-1	
				MIL-T-5583	
				AN5743-2	
29	1	Clock		6A/758	
30	3	Landing gear position indicator		6A/1231	
				AN-5839-1	
31	1	Standby Compass		AN5766-T4	
				MIL-C-5604	
32	2	Pitot static tube heated			
33	1	Pilots check list			
34	2	Deviation card holder			
35	1	Frequency card holder			

III. Hydraulics

Item No.	Qty.	Description	Mfg. Ident.	Military Ident.	Unit Wt.
1	1	Pump-gearbox driven	Vickers PV3907		
2	1	Reservoir 280 in.^{3}			
3	1	Pressure relief valve	AN6279. 8CD		
4	1	High pressure filter			
5	1	Speed brake selector	Marvista Type 32A		
6	1	Landing gear selector	Marvista Type 32A		
7	1	Flap selector	Marvista Type 32A		
8	1	Return filter			
9	2	Flap actuators			
10	2	Speed brake actuators			
11	4	Shuttle valve actuators			
12	2	Main landing gear actuators			
13	1	Reservoir drain valve			
14	1	Ground test coupling-suction			
15	1	Ground test coupling-pressure			
16	1	N.R. valve high pressure	28-75042-6		
17	1	N.R. valve high pressure	28-75042-4		
18	2	N.R. valve low pressure	28-75041-6		
19	1	Nose landing gear actuator			
20	2	Brake boost cylinder	Gladden #311706		
21	1	Parking brake valve	F-86. 151-58035		
22	1	Emergency hand pump	Pesco IH-706-A		
23	1	Emergency Selector			
24	1	System pressure gauge (See instruments)			
25	2	Main Landing gear door actuators			

IV. Furnishings

Item No.	Qty.	Description	Mfg. Ident.	Military Ident.	Unit Wt.
A.		Cockpit Equipment			
1	2	Seat - ejection	Stanley Light-weight		
2	1	Fire extinguisher type A-20		MIL.5220	
3	2	Lap belt, type B-18	51-H3977		
4	2	Shoulder harness			
5	1	Stowage for two-stage lumarith and goggles			
6	1	Crow bar			
7	1	Map stowage			
8	1	Airborne data case			
B.		Oxygen System			
1	1	Converter, liquid oxygen	5 litre Bendix		
2	1	Quantity indicator			
3	1	Pressure relief valve			
4	1	Evaporator 15 ft. 5/16" tube			
5	2	Oxygen regulator			
6	2	Disconnect coupling			
C.		Heating, Vent and Pressurization			
1	1	Primary air exchanger			
2	1	Secondary air exchanger			
3	1	Turbine			
4	1	Dump relief valve			
5	1	Cabin pressure regulator			
6	1	Shut-off valve			
7	1	Flow limit valve			
8	2	Thermostats			
9	1	Shut-off valve (emeregency)			
10	2	Modulating valve			

IV. Furnishings (Cont'd)

Item No.	Qty.	Description	Mfg. Ident.	Military Ident.	Unit Wt.
C.		Heating, Vent and Pressurization (Cont'd)			
11	1	Manual shut-off valve (defrost)			
12	1	Canopy seal pressure regulator			
13	1	Check valve			
14	1	Air filter			
15	1	Pressure relief valve			
16	1	Air pressure regulator (Hydraulic reservoir)			

SUBJECT- V. Electronics

CONFIDENTIAL

V. Electronics

Item No.	Qty.	Description	Mfg. Ident.	Military Ident.	Unit Wt.
A.		V.H.F. Communication Equipment A.R.C. Type 12			
1	1	Receiver	R-19		
2	1	Dynamotor	D-10H		
3	1	Shockmount	M-12A		
4	1	Transmitter	T-11B		
5	1	Shockmount	M-11A		
6	1	Transmitter	T-13A		
7	1	Shockmount	M-11A		
8	1	Control Unit	Type 56		
9	1	Antenna	C.E.E.		
10	1	Relay	K-13		
12	1	Junction box	C.F.E.		
Note -		Cable Harnesses	C.F.E.		
		Miscellaneous equipment	C.F.E.		
B.		Interphone			
1	1	Amplifier	ARC.F-14		
2	1	Mounting	ARC.M-11A		
3	1	Relay assembly	ARC.K-16		
Note -		Cable Harness	C.F.E.		
		Miscellaneous equipment	C.F.E.		
C.		Radio Compass Equipment - Lear Type ADF. 14			
1	1	Amplifier	Lear		
2	1	Control Unit	ADF.14		
3	1	Loop antenna			
4	1	Sense antenna	C.F.E.		
Note -		Cable Installation	C.F.E.		
		Miscellaneous equipment	C.F.E.		

SUBJECT- VI. Power Plant CONFIDENTIAL

VI. Power Plant

Item No.	Qty.	Description	Mfg. Ident.	Military Ident.	Unit Wt.
A.	**Engine**				
1	1	Rolls Royce RB-108 engine			
2	1	High energy igniter units and harness			
3	1	Jet Pipe and thermal blanket			
4	3	Thermocouples and cables			
5	1	Gear box			
6	1	Hydraulic pump (see hydraulics section)	Vickers PV3906		
7	1	Starter generator (see electrical section)			
8	1	Tachometer and cable (see instrumentation)			
B.	**Fuel System**				
1	2	Booster pump			
2	1	Motorized L.P. Cock			
3	2	Service cock			
4	3	Check valve			
5	1	Vent valve			
6	1	Flow meter transmitter (see instrumentation (engine))			
7	1	Set flexible fuel cells			
8	1	Filler cap			

SUBJECT- VII. Landing Gear CONFIDENTIAL

VII. Landing Gear

Item No.	Qty.	Description	Mfg. Ident.	Military Ident.	Unit Wt.
1	1	Nose casing 16.00 x 5.8	Goodyear	MIL-C-5041A	
2	1	Nose tube	Goodyear	MIL-T-5041B	
3	1	Nose wheel 16.00 x 5.8-8.50	Goodyear	MIL-W-5013B	
4	2	Main casing 20 x 4.4, 10 ply	Goodyear	MIL-C-5041A	
5	2	Main tube 20 x 4.4, Fabric base	Goodyear	MIL-T-5014B	
6	2	Main wheel 20 x 4.4 - 12	Goodyear	MIL-W-5013B	
7	2	Heavy duty brake	Bendix	MIL-W-5013B	

SUBJECT-

II. Electrical

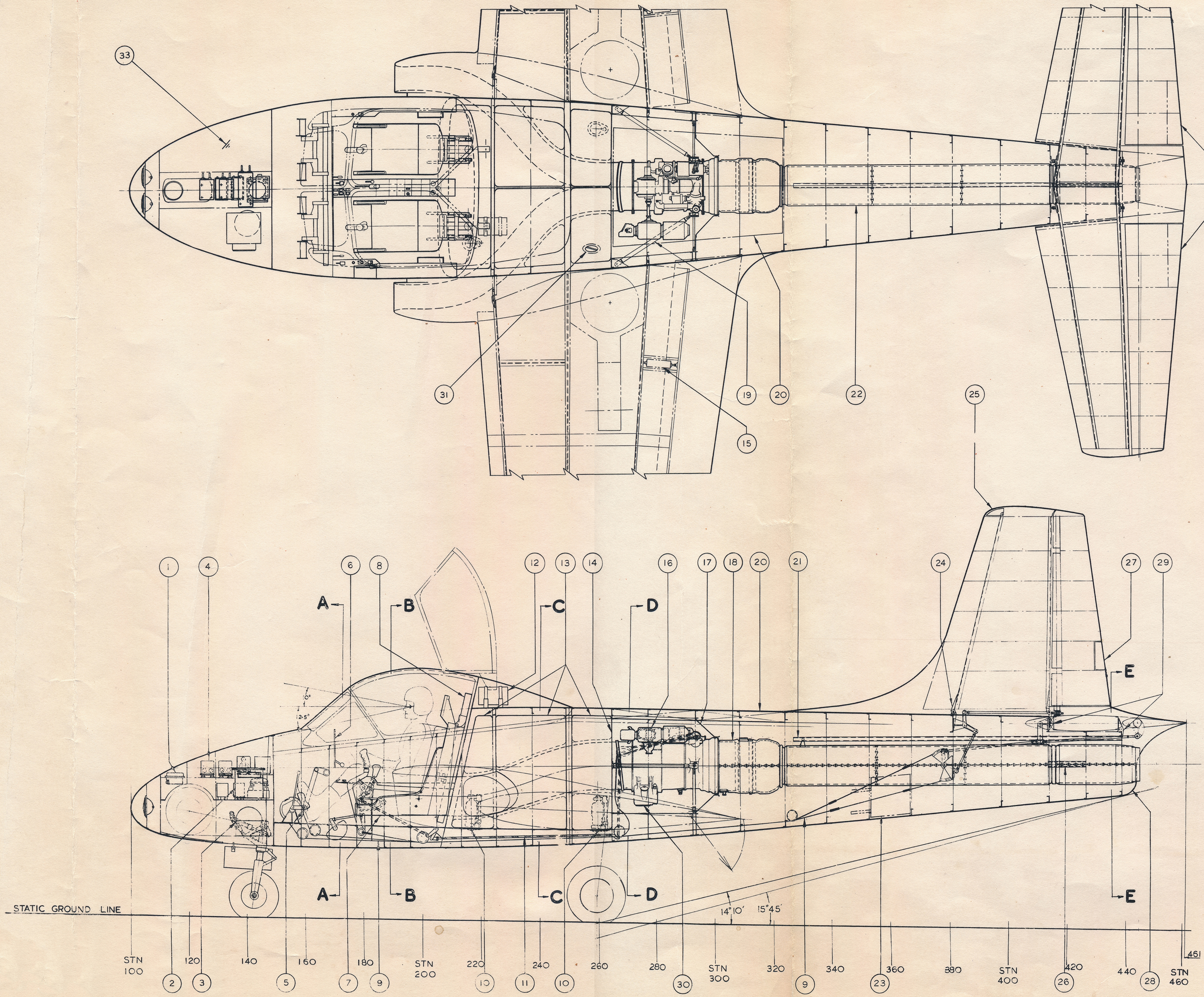
CONFIDENTIAL

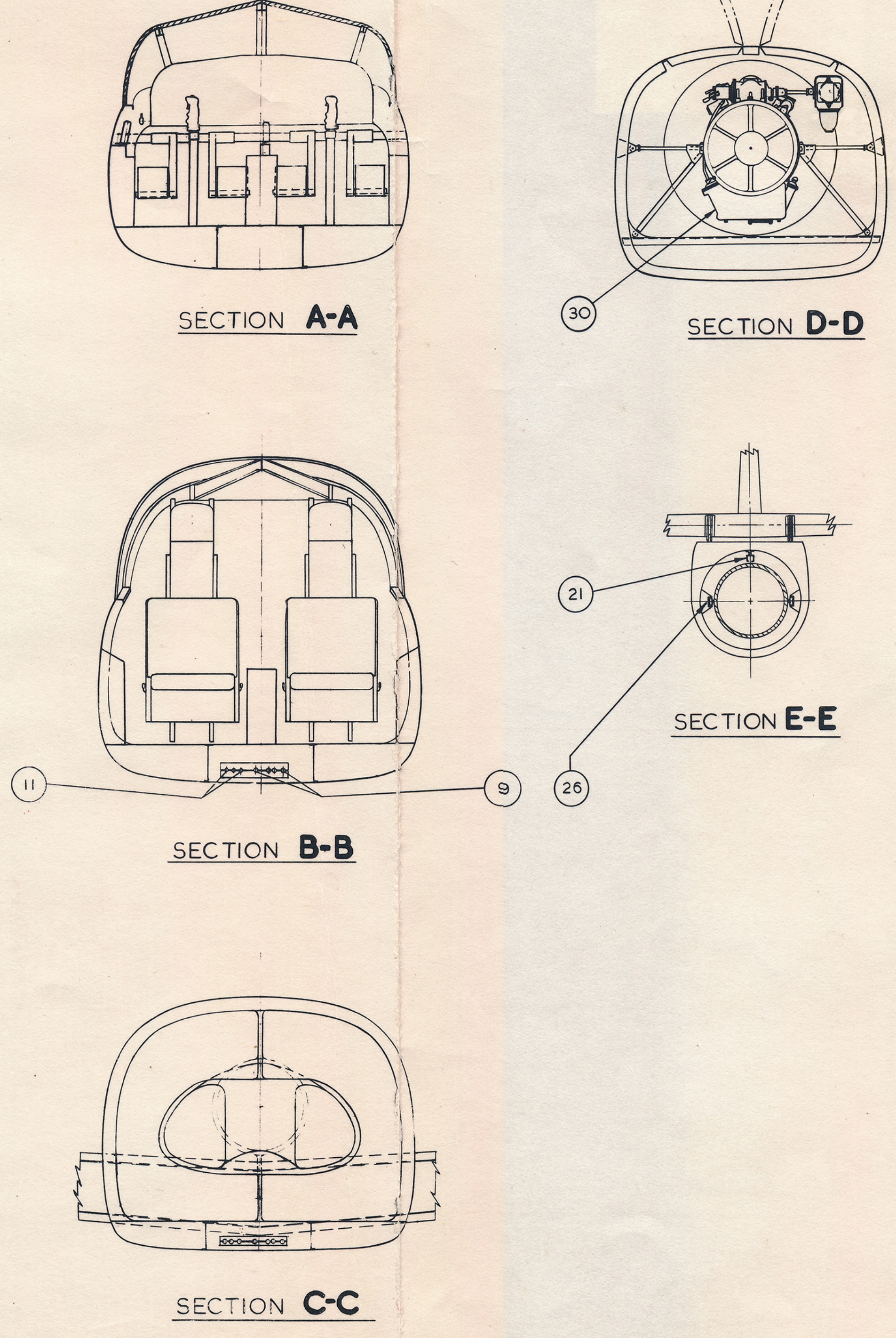
11. Electrical

Item No.	Qty.	Description	Mfg. Ident.	Military Ident.	Unit Wt.
1	1	Starter generator DC. 30 Volt, 250 amp.			
2	1	Battery 28 volt, 36 amp. hour		AN3150-2	
3	1	Voltage regulator 30 volt		17 R 21	
4	1	Reverse current relay		AN3025-1	
				MIL-C-5026	
5	1	Inverter 3 Ø 250VA 115v 400 cycles		AN3532-2	
6	1	Inverter 3 Ø 100 VA 115v 400 cycles		AN3499-1	
7	1	Starter controller		Similar to	
				AN3391-1	
8	1	Flasher Position lights Type CZ		32660	
9	1	Actuator - Canopy			
10	1	Actuator - Elevator trim			
11	1	Horn landing gear Type JZ		32462	
12	4	Light assy. Type A11			
13	2	Light Assy. Type C4A			
14	2	Fuselage position lights		AN3177-9	
15	2	Landing light		AN3129-4523	
16	1	Dual position light tail	Grimes		
			D7200-308	AN3158	
17	1	Position light wing		AN3033-8	
18	1	Position light wing		AN3033-7	
19	3	Rheostat		AN3155-( )	
20	1	Master caution indicator			
21	6	Annunciator	Grimes		
			B8240		
22	1	Light assembly		AN3157-6	
23	1	Ground power receptacle		AN2552A3A	
24	2	Relay fire detector			
25	5	Continuous type fire detector 10' long			
26	3	Light assy. landing gear down. External			
27	1	Passing light 50 watt			
28	1	Loadmeter			
29	1	Autotransformer 115 to 26V			

RD-41-100
Figure 2
Page 6

REFERENCE DRAWINGS
PD5300 3-VIEW G.A.
PD5303 COCKPIT LAYOUT



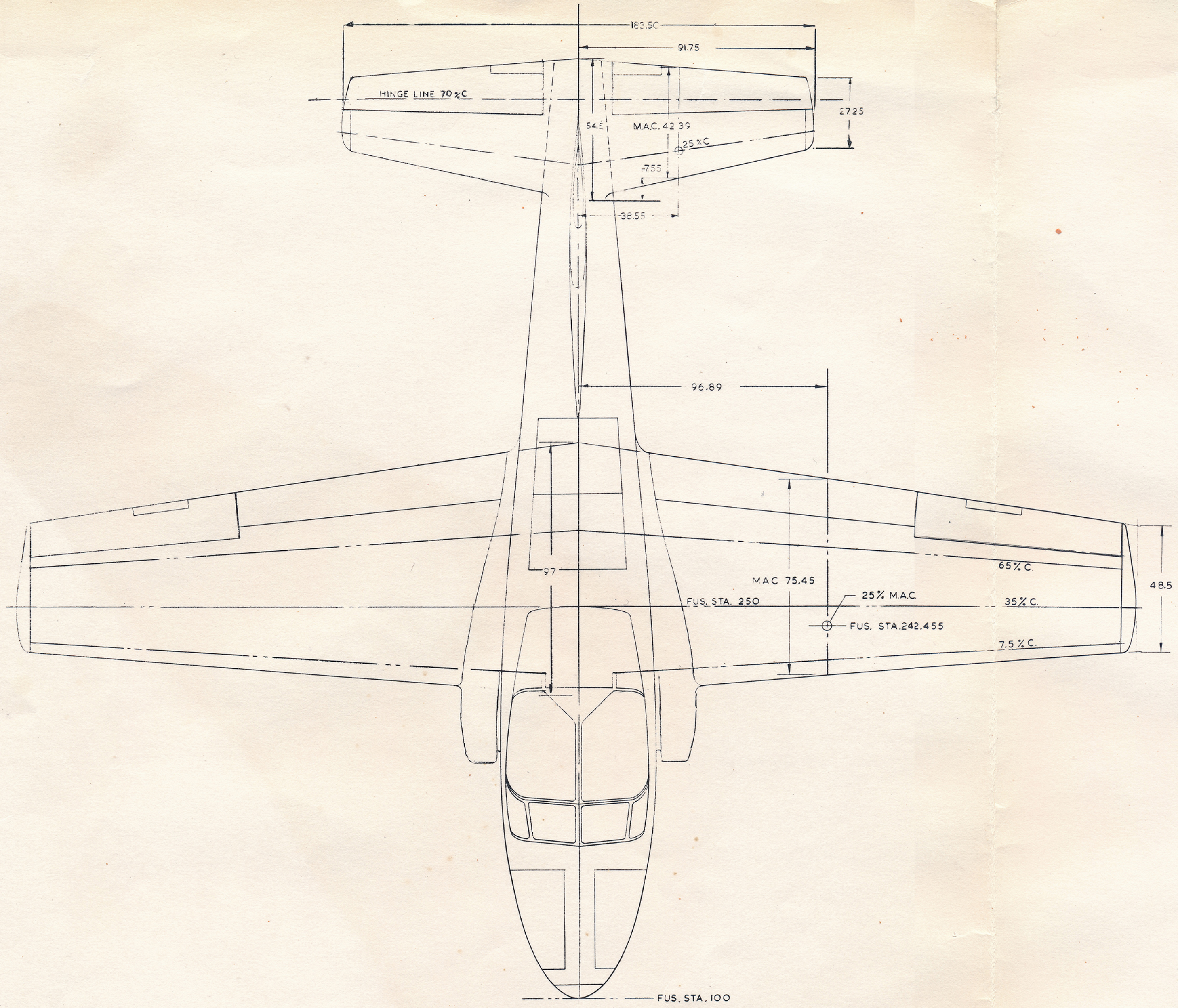


1. LOOP ANTENNA
2. BATTERY
3. LIQUID OXYGEN
4. ELECTRONIC EQUIPMENT
5. RUDDER PEDALS WITH TOE BRAKES
6. INSTRUMENT PANEL
7. LIGHTWEIGHT EJECTION SEAT - STANLEY AV. CORP.
8. CANOPY EJECTION GUN
9. FLYING CONTROLS
10. FUEL PUMPS
11. ENGINE CONTROLS
12. HYDRAULIC RESERVOIR
13. BAG TYPE FUEL CELLS
14. FIREWALL FRONT
15. FLAP ACTUATOR
16. ACCESSORY GEARBOX - STARTER GENERATOR & HYDRAULIC PUMP
17. FIREWALL - REAR
18. ROLLS ROYCE R B 108
19. ENGINE TRUNNION MOUNTING
20. POWER PLANT ACCESS
21. JET PIPE GUIDE RAIL
22. JET PIPE WITH THERMO BLANKET
23. SPEED BRAKES
24. VERTICAL STABILIZER ATTACHMENT
25. VHF ANTENNA
26. JET PIPE SUPPORT
27. RUDDER TAB
28. DETACHABLE REAR FAIRING
29. HORIZONTAL STABILIZER ATTACHMENT
30. OIL TANK
31. SINGLE POINT FILLER
32. ELEVATOR TAB (L.H. SPRING TYPE)
33. UTILITY COMPARTMENT

0 10 20 30 40 50 60 70 80 90 100
SCALE - INCHES

CANADAIR LIMITED MONTREAL CANADA	INBOARD PROFILE	DRAFT		SPECIFICATION	
		CHECKED		MODEL NO.	CL41-1
		SECTION CHIEF		STUDY NO.	
		APPROV			
		SCALE	1/10	PD5301	

ISS	MODIFICATION
A	WHEEL BASE DIM. WAS 117.8 IN TABLE ADDED ELEVATOR DEFLECTION 25° UP 10° DN. CORRECTED SIZE OF ENGINE ACCESS DOOR. REDESIGN OF EQUIPMENT ACCESS DOOR (NOSE). REDESIGN OF CANOPY HINGE REDUCED DUCT FAIRINGS ADDED LIGHTS IN NOSE. 1-10-56 R.W.D.



GENERAL CHARACTERISTICS

DIMENSIONS:
- SPAN — 36 FT. 4 IN.
- LENGTH OVERALL — 30 FT. 1 IN.
- HEIGHT OVERALL — 11 FT. 11 IN.

WEIGHTS:
- DESIGN GROSS WT. — 6250 LBS.
- WEIGHT EMPTY — 3876 LBS.

WING:
- AREA (TOTAL) — 220 SQ. FT.
- AREA (OUTER PANEL) — 90.6 SQ. FT.
- AIRFOIL (ROOT) — NACA 63A014
- AIRFOIL (TIP) — NACA 63A212
- INCIDENCE (ROOT) — 3°
- INCIDENCE (TIP) — 1° 30'
- SWEEPBACK (35% CHORD) — 0°
- AILERON:
  - AREA (TOTAL) — 17 SQ. FT.
  - AREA AFT OF HINGE (EACH) — 8.5 SQ. FT.
  - SPAN EA. IN % OF WING SEMI SPAN — 38%
  - DEFLECTION — ± 16°
- FLAP:
  - TYPE — SINGLE-SLOTTED
  - SPAN IN % OF WING SPAN — 46%
  - DEFLECTION — 40°

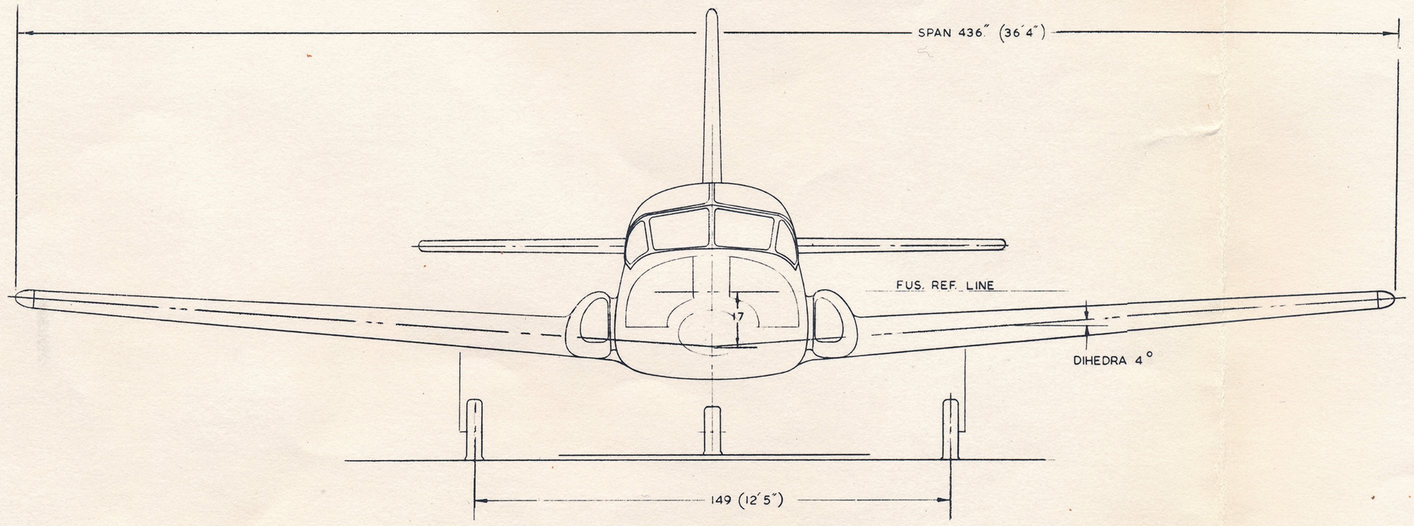
DIVE BRAKE:
- PROJECTED AREA — 3 SQ FT
- DEFLECTION — 50°

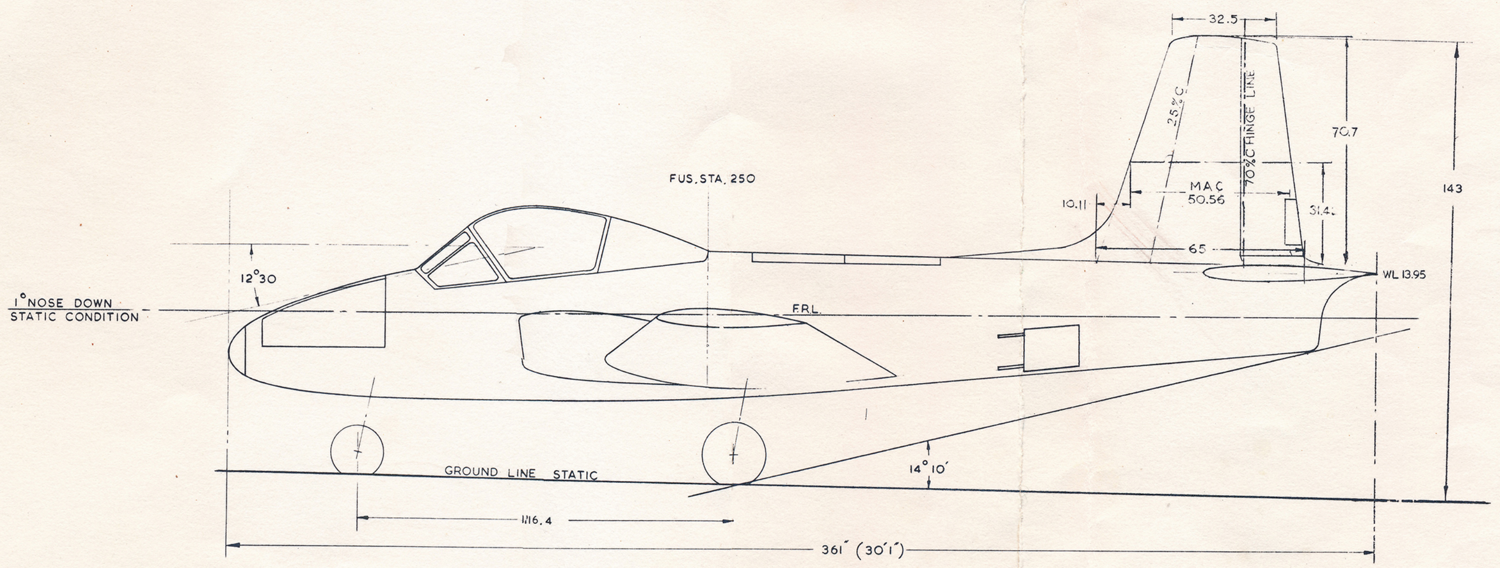
HORIZONTAL TAIL:
- AREA TOTAL — 52.0 SQ. FT.
- AIRFOIL ROOT & TIP — NACA 63A010
- DEFLECTION (ELEVATOR) 25° UP, 10° DN.

VERTICAL TAIL:
- AREA TOTAL — 23.9 SQ. FT.
- AREA RUDDER — 7 SQ. FT.
- AIRFOIL ROOT & TIP — NACA 63A010
- DEFLECTION RUDDER — ± 25°

ALIGHTING GEAR:
- MAINWHEEL TIRE — 20 x 4.4
- NOSEWHEEL TIRE — 16 x 5.8

POWER PLANT:
- TYPE — ROLLS-ROYCE RB-108





0 10 20 30 40 50 60 70 80 90 100

SCALE - INCHES

ISSUE "A"

CANADAIR LIMITED MONTREAL CANADA	3-VIEW GENERAL ARRANGEMENT	DRAFT	R. [signature]	SPECIFICATION	
		CHECKED		MODEL NO.	CL-41-1
		SECTION CHIEF	[signature]	STUDY NO.	
		APPROV.		PD5300	
		SCALE	1/20		